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ERRATA

NSA, Vol. 6, No. 6B, p.12 of Supplement. The isotope ${}_{57}\mathrm{La}_{81}^{138}$ should appear in the first column, top line.

NSA, Vol. 6, No. 10, p. 393. In abstract 3114, the value 2.03^2 mc should be 2.03 mc^2.

REPORTS REFERENCE LIST

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The abstract number for each report is listed at the upper right of the entry. If the number bears an asterisk, the report is title listed only and no abstract is included.

U. S. ATOMIC ENERGY COMMISSION DECLASSIFIED REPORTS

AECD-3358 3631
Oak Ridge National Lab.
AN EXPERIMENTAL STUDY OF THE PERFORMANCE OF A CAVITY TYPE IONIZATION CHAMBER, by G. H. Jenks, W. M. Breazeale, and J. J. Hairston. [nd] Decl. with deletions Apr. 28, 1952. 8p. (AECD-3358)

AECD-3367 3513
Argonne National Lab.
STABILITY OF SOLVATES OF URANYL NITRATE IN NON-POLAR SOLVENTS, by H. M. Feder, L. Ross and R. C. Vogel. Mar. 1952. Decl. Apr. 25, 1952. 4p. (AECD-3367; ANL-SL-548)

AECD-3369 3629
Radiation Lab., Univ. of Calif.
DESCRIPTION OF A DROPPING MERCURY POLAROSCOPE. [nd] 24p. Decl. May 5, 1952. (AECD-3369; RL-4.6.261)

AECD-3371 3614
Stamford Research Labs., American Cyanamid Co.
AN INFRARED GAS ANALYZER FOR MEASURING THE CONCENTRATION OF FLUOROCARBON VAPORS IN AIR, by Van Zandt Williams and Robery S. McDonald. [nd] Decl. May 5, 1952. 15p. (AECD-3371; A-3958)

U. S. ATOMIC ENERGY COMMISSION UNCLASSIFIED REPORTS

AECU-1962 3540
Knolls Atomic Power Lab.
PROCESSING OF NUCLEAR FUELS, by Edwin L. Zebroski and John F. Flagg. [nd] 22p. (AECU-1962)

AECU-1970 3531
Notre Dame Univ.
RADIATION CHEMISTRY OF PURE ORGANIC COMPOUNDS: BENZENE AND BENZENE-d_6, by Sheffield Gordon and Milton Burton. [nd] 30p. (AECU-1970)

AECU-1973 3514
Ames Lab.
THE DISPROPORTIONATION OF MANGANATE ION; MANGANESE DIOXIDE AS HETEROGENEOUS CATALYST, by Frederick R. Duke. [nd] 7p. (AECU-1973)

AECU-1977 3610
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THE LIQUEFACTION AND STORAGE OF PARTIALLY CONVERTED LIQUID HYDROGEN, by E. R. Grilly. [nd] 12p. (AECU-1977; LADC-1136)

AECU-1980 3515
Notre Dame Univ.
BROMINE ATOM CATALYZED REARRANGEMENTS OF THE THREE ISOMERIC BROMOPROPENES (thesis), by Elliott J. Burrell. Aug. 1, 1951. 13p. (AECU-1980)

AECU-1982 3532
Notre Dame Univ.
ELEMENTARY PROCESSES IN RADIATION CHEMISTRY. III. CHARGE TRANSFER MECHANISMS, by John L. Magee. [nd] 22p. (AECU-1982)

AECU-1983 3533
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CHARGE NEUTRALIZATION BY REACTION BETWEEN POSITIVE AND NEGATIVE IONS, by John L. Magee. [nd] 29p. (AECU-1983)

AECU-1985 3675
Notre Dame Univ.
CHEMICAL KINETICS OF ATOMIC BROMINE FROM NUCLEAR ISOMERIC TRANSITION, by William H. Hamill and Jay A. Young. [nd] 23p. (AECU-1985)

AECU-1987 3609
Los Alamos Scientific Lab.
TABLES OF THE LENNARD-JONES AND DEVONSHIRE EQUATION OF STATE AT HIGH TEMPERATURE AND DENSITIES, by W. Fickett and William W. Wood. [nd] 22p. (AECU-1987; LADC-1145)

AECU-1992 3484
Cancer Research Inst., New England Deaconess Hospital, Boston
THERAPY OF ACUTE RADIATION HYPOTENSION IN THE RAT, by P. O'B. Montgomery and Shields Warren. [nd] 7p. (AECU-1992)

AECU-1994 3485
Cancer Research Inst., New England Deaconess Hospital, Boston
EFFECTS OF ACUTE RADIATION ON THE ADULT MAMMALIAN CENTRAL NERVOUS SYSTEM, by Samuel P. Hicks and Philip O'B. Montgomery. Cancer Research Inst., New England Deaconess Hospital, Boston and Laboratory of Pathology, Harvard Cancer Commission. [nd] 15p. (AECU-1994)

AECU-1996 3630
Argonne National Lab.
A VACUUM LOCK FOR ROUTINE SOLID ANALYSES WITH A MASS SPECTROMETER, by Charles M. Stevens. Dec. 1951. 19p. (AECU-1996; UAC-535)

AECU-1999 3711
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THE DECAY OF SPONTANEOUS EMISSION, by E. J. Hellund. Mar. 1952. 20p. (AECU-1999; UAC-542)

AECU-2000 3486
Argonne National Lab.
STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS; VII. CELLULAR RESPIRATION, CELL DIVISION AND IONIZING RADIATIONS, by E. S. Guzman Barron and S. Louise Seki. Mar. 1952. 11p. (AECU-2000; UAC-547)

AECU-2001 3487
Argonne National Lab.
THE EFFECT OF X RAYS ON THYMOCYTES AND ITS MODIFICATION BY CYSTEINE, by H. M. Patt, M. E. Blackford and R. L. Straube. Mar. 1952. 17p. (AECU-2001; UAC-541)

AECU-2003 3512
Sloan-Kettering Inst. for Cancer Research
EFFECT OF NITROGEN MUSTARD ON NUCLEIC ACID METABOLISM, by David A. Goldthwait. [nd] 11p. (AECU-2003)

AECU-2005 3687
Institute for Nuclear Studies, Univ. of Chicago
IDENTIFICATION AND YIELDS OF $(\gamma,\alpha n)$ REACTIONS, by R. B. Holtzman and Nathan Sugarman. [nd] 19p. (AECU-2005)

AECU-2006 3676
Los Alamos Scientific Lab.
CROSS SECTIONS OF THE $D(t,n)He^4$ REACTION FOR 80- TO 1200-KEV TRITONS, by H. V. Argo, R. F. Taschek, H. M. Agnew, A. Hemmendinger, and W. T. Leland. [nd] 21p. (AECU-2006; LADC-1122)

AECU-2007 3684
Northwestern Univ.
STUDIES OF THE $Li^6(n,\alpha)H^3$ REACTION AND NEUTRON ENERGY MEASUREMENTS WITH NUCLEAR EMULSIONS, by James H. Roberts. Sept. 15, 1951. 64p. (AECU-2007; Progress Report No. 2)

AECU-2008 3520
Chemical Lab., Illinois Inst. of Tech.
THE HYDROGEN FLUORIDE SOLVENT SYSTEM; POLAROGRAPHIC STUDIES, by Alan F. Clifford and George Balog. Aug. 1951. 12p. (AECU-2008)

AECU-2009 3559
Argonne National Lab.
APPLICATION OF INDUCTION HEATING TO THE MEASUREMENTS OF HIGH TEMPERATURE PROPERTIES, by R. J. Thorn and O. C. Simpson. Apr. 10, 1952. 21p. (AECU-2009; UAC-551)

AECU-2010 3560
Knolls Atomic Power Lab.
VORTICITY HEAT TRANSFER IN MOLTEN METALS, by R. G. Kennison. Apr. 11, 1952. 27p. (AECU-2010)

AECU-2011 3603
Knolls Atomic Power Lab.
ON PLASTIC FLOW IN ALKALI HALIDE CRYSTALS, by W. W. Tyler. [nd] 4p. (AECU-2011)

AECU-2013 3488
Philadelphia General Hospital
INFRARED SPECTRA OF THE BRAIN AND LIPIDS, by H. P. Schwarz, H. E. Riggs, C. F. Glick, J. McGrath, W. Cameron, E. Beyer, E. Bew, Jr., and L. Trombetta. [nd] 3p. (AECU-2013)

AECU-2014 3620
Biophysical Lab., Harvard Medical School
EMISSION REGULATOR FOR MASS SPECTROMETER, by A. K. Solomon and David C. Caton. [nd] 5p. (AECU-2014)

AECU-2015 3686
Wisconsin Univ.
ENERGY LEVELS IN Si^{28} EXCITED BY ALPHA PARTICLES ON Mg^{24}, by S. G. Kaufmann, E. Goldberg, L. J. Koester and F. P. Mooring. [nd] 15p. (AECU-2015)

AECU-2016 3525
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THE CRYSTAL STRUCTURE OF K_2TiF_6, by Stanley Siegel. Apr. 1952. 4p. (AECU-2016; UAC-556)

AECU-2019 3671
Argonne National Lab.
THERMAL NEUTRON ABSORPTION CROSS SECTION OF DEUTERIUM, by Louis Kaplan, K. E. Wilzbach and G. R. Ringo. Apr. 1952. 4p. (AECU-2019; UAC-562)

AECU-2020 3726
Argonne National Lab.
RESOLUTION OF A SCINTILLATION COUNTER SPECTROMETER, by Virginia Hummel and Bernard Hamermesh. Apr. 1952. 3p. (AECU-2020; UAC-558)

ANL-4771 3591
Argonne National Lab.
THE IONIZATION OF GAS MIXTURES IN STELLAR INTERIORS, by Geoffrey Keller and Roland E. Meyerott. Mar. 1952. 31p. (ANL-4771)

BNL-1147 3516
Brookhaven National Lab.
EQUILIBRIUM IN THE EXCHANGE OF HYDROGEN BETWEEN PHOSPHINE AND WATER, by Ralph E. Weston, Jr., and Jacob Bigeleisen. [nd] 11p. (BNL-1147)

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NINTH QUARTERLY REPORT (DECEMBER 1, 1951–FEBRUARY 29, 1952); PREPARATION OF HIGH PURITY MAGNESIUM AND A STUDY OF THE EFFECT OF NON-METALLIC AND ALKALI METAL IMPURITIES ON THE CORROSION CHARACTERISTICS OF PURE MAGNESIUM. [nd] 56p. (COO-88)

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SPECTROPHOTOMETRIC INVESTIGATIONS OF SOME COMPLEXES OF RUTHENIUM. IV. RUTHENIUM REACTIONS WITH THIOSEMICARBAZIDE, 4-PHENYLTHIOSEMICARBAZIDE, AND DIPHENYLTHIOCARBAZIDE, by Ruth Powers Yaffe and Adolf F. Voigt. May 9, 1952. 16p. (ISC-196(Rev.)

ISC-216 3546
Ames Lab.
THE EFFECT OF STEAM ACTIVATION ON MULTILAYER ADSORPTION FROM SOLUTION BY CARBON, by Robert S. Hansen, Robert D. Hansen, and Roy P. Craig. May 5, 1952. 19p. (ISC-216)

KAPL-725 3623
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COMBINING ERRORS INVOLVING A CALIBRATION CURVE, by W. S. Horton. Apr. 14, 1952. 15p. (KAPL-725)

KAPL-728 3526
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THE CRYSTAL CHEMISTRY OF THE VANADIUM COMPOUNDS, by J. S. Lukesh. Mar. 6, 1950. 31p. (KAPL-728)

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Los Alamos Scientific Lab.
TABLES OF FUNCTIONS ASSOCIATED WITH THE SERBER-WILSON METHOD FOR NEUTRON DIFFUSION CALCULATIONS IN A SPHERICAL GEOMETRY; VOLUME II, by Dura Sweeney, Max Goldstein and Bengt Carlson. May 1950. 81p. (LA-1365)

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Los Alamos Scientific Lab.
TABLES OF FUNCTIONS ASSOCIATED WITH THE SERBER-WILSON METHOD FOR NEUTRON DIFFUSION CALCULATIONS IN A SPHERICAL GEOMETRY; VOLUME III, by Dura Sweeney, Max Goldstein and Bengt Carlson. Dec. 1950. 54p. (LA-1366)

MLM-663 3583
Mound Lab.
REPORT FOR RESEARCH ON URANIUM SALTS, NOVEMBER 5, 1951 TO FEBRUARY 5, 1952, by E. Orban. Mar. 10, 1952. 23p. (MLM-663)

NAA-SR-171 3574
North American Aviation, Inc.
RELATIVE ORDERING RATES IN THE SUPERLATTICE ALLOY AuCu, by P. G. Stello. Issued Apr. 2, 1952. 32p. (NAA-SR-171)

NAA-SR-178 3572
North American Aviation, Inc.
PREPARATION OF DROSS-FREE SODIUM AND OTHER LOW MELTING METALS AND ALLOYS BY THE UNDER POUR METHOD, by L. Silverman. Issued Apr. 1952. 8p. (NAA-SR-178)

NEPA-1377 3556
Babcock and Wilcox Co.
EROSION AND HEAT TRANSFER WITH LIQUID METALS; PROGRESS REPORT IV, MARCH 16–APRIL 15, 1950, by H. G. Elrod, Jr. and Richard R. Fouse. Apr. 18, 1950. 9p. (NEPA-1377)

NEPA-1504 3557
Babcock and Wilcox Co.
EROSION AND HEAT TRANSFER WITH LIQUID METALS; PROGRESS REPORT VII, JUNE 17 - JULY 17, 1950, by H. G. Elrod, Jr. July 17, 1950. 9p. (NEPA-1504)

NYO-1581 3555
Harvard Univ. School of Public Health
AIR CLEANING STUDIES; PROGRESS REPORT FOR FEBRUARY 1, 1950 TO JANUARY 31, 1951, by Melvin W. First, Leslie Silverman, Richard Dennis, Glenn A. Johnson, August T. Rossano, Jr., Ralpn Moschella, Charles Billings, Edward Berly, Sheldon Friedlander, and Philip Drinker. June 30, 1951. 222p. (NYO-1581)

NYO-3008 3673
Palmer Physical Lab., Princeton Univ.
EXCITED STATES OF THE LITHIUM ISOTOPES, by W. Franzen and J. G. Likely. [nd] 1p. (NYO-3008)

NYO-3072 3622
Nuclear Development Associates, Inc.
ASYMPTOTIC SOLUTIONS OF VOLTERRA INTEGRAL EQUATIONS, by J. Ernest Wilkins, Jr. Feb. 25, 1952. 11p. (NYO-3072)

NYO-3462 3567
New York Univ.
INORGANIC CORROSION INHIBITORS IN ACID SOLUTION, by Cecil V. King, Emil Goldschmidt and Natalie Mayer. Apr. 15, 1952. 12p. (NYO-3462)

ORNL-1164 3584
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PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 66p. (ORNL-1164)

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SCINTILLATION SPECTROMETRY AND ELECTRONIC DEVELOPMENT, sects.1 and 2 of PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 14p. (ORNL-1164(sects.1 and 2))

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SHORT-LIVED ISOMERS AND DIRECTIONAL ANGULAR CORRELATION OF SUCCESSIVE GAMMA RAYS, SHORT-PERIOD ACTIVITIES, AND HIGH-VOLTAGE ACCELERATOR PROGRAM, sects.3, 4, and 5 of PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 17p. (ORNL-1164(sects.3, 4, and 5))

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NEUTRON-DIFFRACTION STUDIES AND A CRYSTAL SPECTROMETER AS A SOURCE OF MONOENERGETIC THERMAL NEUTRONS, sects.6 and 7 of PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 10p. (ORNL-1164(sects.6 and 7))

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ORNL-1199 3615
Oak Ridge National Lab.
AN AUTOMATIC MULTIRANGE RECORDING DEVICE FOR MEASURING VARYING POTENTIALS, by J. C. Pigg. Issued May 8, 1952. 32p. (ORNL-1199)

ORO-64 3619
Vanderbilt Univ.
THE VANDERBILT BETA-RAY SPECTROMETER AND THE RADIOACTIVE DECAY OF TIN 113 (thesis), by Dan A. Thomas. [nd] 77p. (ORO-64)

ORO-65 3581
North Carolina State Coll.
PROGRESS REPORT NO. 3 COVERING PERIOD JANUARY 1, 1952–MARCH 31, 1952; THE MEASUREMENT OF THERMAL PROPERTIES OF NON-METALLIC MATERIALS AT HIGH TEMPERATURES, by K. O. Beatty, Jr. Apr. 30, 1952. 19p. (ORO-65; Progress Report No. 3)

TID-82 (Suppl. 1) 3550
Technical Information Service, AEC
GMELIN'S HANDBOOK OF INORGANIC CHEMISTRY; URANIUM AND ISOTOPES; SYSTEM NUMBER 55; by L. Gmelin; translated from 8th German Edition, Berlin, 1936, by Cyrus Feldman. [nd] 164p. (TID-82 (Suppl. 1)

TID-5059(1st rev.) 3481*
Technical Information Service, AEC
CORPORATE AUTHOR ENTRIES USED IN CATALOGING REPORTS BY TECHNICAL INFORMATION SERVICE, AEC. [Charlotte Forgey Chesnut, comp.] May 1952. (TID-5059 (1st rev.)

UCLA-196 3628
Atomic Energy Project, Univ. of Calif., Los Angeles
NOTE ON A METHOD FOR THE SPEEDING UP AND IMPROVING THE CONTRAST OF THYROID SCINTIGRAMS, by Lawrence Curtis and Benedict Cassen. Issued Apr. 25, 1952. 8p. (UCLA-196)

UCRL-1526 3648
Radiation Lab., Univ. of Calif.
SUMMARY OF THE RESEARCH PROGRESS MEETING OF AUGUST 2, 1951, by Bonnie E. Cushman. Oct. 25, 1951. 5p. (UCRL-1526)

UCRL-1698 3694
Radiation Lab., Univ. of Calif.
A HIGH INTENSITY PULSED ION SOURCE, by James D. Gow and John S. Foster, Jr. Mar. 14, 1952. 21p. (UCRL-1698)

UCRL-1729 3580
Radiation Lab., Univ. of Calif.
PHYSICS DIVISION QUARTERLY REPORT; NOVEMBER, DECEMBER, 1951 AND JANUARY, 1952. Mar. 18, 1952. 43p. (UCRL-1729)

UCRL-1743 3482
Radiation Lab., Univ. of Calif.
EFFECT OF INOSITOL AND OCTADECYL ALCOHOL FEEDING ON LIPOPROTEINS IN CHOLESTEROL FED RABBITS, by Frank T. Pierce, Jr. and David Kritchevsky.

Div. of Medical Physics, Univ. of California and Donner Lab., Univ. of Calif. and Radiation Lab., Univ. of Calif. Mar. 1952. 12p. (UCRL-1743)

UCRL-1747 3521
Radiation Lab., Univ. of Calif.
MASS SPECTROMETRIC DETERMINATION OF GAS IMPURITIES SEPARABLE BY CONDENSATION, by Amos Newton. Apr. 3, 1952. 12p. (UCRL-1747)

UCRL-1751 3672
Radiation Lab., Univ. of Calif.
SUMMARY OF THE RESEARCH PROGRESS MEETING OF MARCH 6, 1952, by Sergey Shewchuck. Apr. 8, 1952. 6p. (UCRL-1751)

UCRL-1752 3665
Radiation Lab., Univ. of Calif.
SUMMARY OF THE RESEARCH PROGRESS MEETINGS FOR JANUARY 1952, by S. Shewchuck. Apr. 8, 1952. 8p. (UCRL-1752)

UCRL-1757 3547
Radiation Lab., Univ. of Calif.
SOME OBSERVATIONS OF THE MASS SPECTRUM OF CO$_2$, by Amos S. Newton. Apr. 9, 1952. 5p. (UCRL-1757)

UR-196 3489
Atomic Energy Project, Univ. of Rochester
BIOLOGICAL EFFECTS OF IONIZING RADIATION, by M. Ingram, W. B. Mason, G. Hoyt Whipple, and Joe W. Howland. Mar. 7, 1952. 76p. (UR-196)

UR-198 3518
Atomic Energy Project, Univ. of Rochester
PHYSICOCHEMICAL STUDIES OF BERYLLIUM COMPLEXES. IV. ION-EXCHANGE STUDIES OF THE BERYLLIUM-CITRATE COMPLEX, by Isaac Feldman, Jean R. Havill, and William F. Neuman. Apr. 25, 1952. 13p. (UR-198)

OTHER UNCLASSIFIED REPORTS OF SPECIAL INTEREST TO AEC LABORATORIES

AERE C/M-132 3522
[Atomic Energy Research Establishment, Harwell, Berks] (England)
THE ESTIMATION OF FREE ACIDITY IN SOLUTIONS OF THORIUM NITRATE, by L. Airey. [nd] 6p. (AERE C/M-132)

AERE C/R-809 3541
Atomic Energy Research Establishment, Harwell, Berks (England)
THEORY OF ION EXCHANGE; II. EQUILIBRIA BETWEEN AN ION EXCHANGER AND AN AQUEOUS SOLUTION WITH A COMMON CATION, by J. F. Duncan and E. Glueckauf. Jan. 1, 1952. 16p. (AERE C/R-809)

AERE G/M-127 3685
Atomic Energy Research Establishment, Harwell, Berks (England)
CROSS SECTIONS FOR THE PHOTODISINTEGRATIONS ^{12}C(γ,3α) AND ^{16}O(γ,4α), by F. K. Goward and J. J. Wilkins. Mar. 24, 1952. 12p. (AERE G/M-127)

AERE M/R-829 3582
Atomic Energy Research Establishment, Harwell, Berks (England)
SEDIMENTATION FROM CONCENTRATED SUSPENSIONS IN RELATION TO PARTICLE SIZE, by E. B. Allison and P. Murray. Nov. 26, 1951. 14p. (AERE M/R-829)

AERE M/R-856 3613
Atomic Energy Research Establishment, Harwell, Berks (England)
THE EXAMINATION OF METALS UNDER POLARISED LIGHT; PART V. FURTHER WORK ON THE EFFECT OF STRAIN IN OBJECTIVE LENSES, by B. W. Mott, H. R. Haines, and J. Woodrow. Feb. 4, 1952. 18p. (AERE M/R-856)

NACA-RM-E50F19 3561
Lewis Flight Propulsion Lab., NACA
INTERNAL FILM COOLING EXPERIMENTS IN 4-INCH DUCT WITH GAS TEMPERATURES TO 2000°F, by George R. Kinney and John L. Sloop. Sept. 21, 1950. 34p. (NACA-RM-E50F19)

NACA-TN-2627 3626
Ohio State Univ.
COINCIDENCE METHOD APPLIES TO ION BEAM MEASUREMENT, by Stanley Fultz and M. L. Pool. Feb. 1952. 13p. (NACA-TN-2627)

NACA-TN-2647 3725
Lewis Flight Propulsion Lab., NACA
IMPLICATION OF THE TRANSPORT EQUATION FOR THE SEMIEMPIRICAL TREATMENT OF SHIELDS, by Philip Schwed. Mar. 1952. 31p. (NACA-TN-2647)

NACA-TN-2650 3693
Research Foundation, Ohio State Univ.
RADIOAUTOGRAPHIC METHOD FOR EXAMINING DISTRIBUTION OF PARTICLES IN A CYCLOTRON BEAM, by M. L. Pool and S. Fultz. Mar. 1952. 20p. (NACA-TN-2650)

NBS-1439 3530
National Bureau of Standards
THERMAL PROPERTIES OF FLUORINE COMPOUNDS; HEAT CAPACITY, ENTROPY, HEAT CONTENT AND FREE ENERGY FUNCTIONS OF CARBON DIFLUORIDE, CARBON TRIFLUORIDE, CARBON TETRAFLUORIDE AND DIFLUOROACETYLENE IN THE IDEAL GASEOUS STATE, by Rita M. Potocki and David Emerson Mann. Feb. 15, 1952. 59p. (NBS-1439; U21669)

NP-3730 3627
National Bureau of Standards
FINAL REPORT ON MODEL 1; GAMMA SURVEY INSTRUMENT. April 25, 1951. 20p. (NP-3730)

NP-3745 3523
Tour, Sam, and Co., Inc.
INTERIM TECHNICAL REPORT; RESEARCH AND DEVELOPMENT OF METHODS OF CHEMICAL ANALYSIS FOR TITANIUM METAL AND ITS ALLOYS, by Dennis Ord, Anna Aronson and Peter A. Morrell. Mar. 3, 1952. 77p. (NP-3745; WAL Report No. 401/48/A-8; U21721)

NP-3762 3706
National Bureau of Standards
PENETRATION AND DIFFUSION OF X-RAYS; MATHEMATICAL TECHNIQUES, by L. V. Spencer. Mar. 3, 1951. 14p. (NP-3762)

NP-3823 3692
Concordia Coll.
TECHNIQUES OF PARTICLE ENERGY CONTROL WITH VAN DE GRAAFF ACCELERATORS; NUCLEAR SCIENCE SERIES PRELIMINARY REPORT NO. 12, by Carl L. Bailey and John H. Williams. Concordia Coll. and Univ. of Minnesota. 1952. 9p. (NP-3823; Preliminary Report No. 12)

NP-3826 3682
Tata Inst. of Fundamental Research, Bombay (India)
LECTURES ON THE THEORY OF NUCLEAR REACTORS; WINTER TERM (1951–52), by C. Salvetti. Tata Inst. of Fundamental Research, Bombay (India) and Univ. of Milan (Italy). [nd] 170p. (NP-3826)

NP-3827 **3568**
Department of Mines and Technical Surveys (Canada).
ELECTRONIC CONCENTRATION OF RADIOACTIVE ORES WITH THE LAPOINTE PICKER BELT, by C. M. Lapointe and R. D. Wilmot. Mar. 10, 1952. 25p. (NP-3827; TR-95/52)

R52GL42 **3558**
General Engineering Lab., General Electric Co.
MAGNETIC FLOWMETER OUTPUT POTENTIALS, by E. R. Astley. Mar. 1, 1952. 13p. (R52GL42)

USNRDL-340 **3490**
Naval Radiological Defense Lab.
THE SENSITIVITY OF IRRADIATED RATS TO CONDITIONS OF LOW OXYGEN TENSION AT REDUCED BAROMETRIC PRESSURES, by D. J. Kimeldorf and B. D. Newsom. Mar. 11, 1952. 18p. (USNRDL-340)

USNRDL-341 **3500**
Naval Radiological Defense Lab.
DECREASED X-RAY SENSITIVITY OF MICE FOLLOWING ADMINISTRATION OF ETHANOL, by L. J. Cole and M. E. Ellis. [nd] 19p. (USNRDL-341)

NUCLEAR SCIENCE ABSTRACTS

Vol. 6 June 30, 1952 No. 12A

GENERAL

3481

Technical Information Service, AEC

CORPORATE AUTHOR ENTRIES USED IN CATALOGING REPORTS BY TECHNICAL INFORMATION SERVICE, AEC. [Charlotte Forgey Chesnut, comp.] May 1952. (TID-5059 (1st rev.)

BIOLOGY AND MEDICINE

3482

Radiation Lab., Univ. of Calif.

EFFECT OF INOSITOL AND OCTADECYL ALCOHOL FEEDING ON LIPOPROTEINS IN CHOLESTEROL FED RABBITS, by Frank T. Pierce, Jr. and David Kritchevsky. Div. of Medical Physics, Univ. of California and Donner Lab., Univ. of Calif. and Radiation Lab., Univ. of Calif. Mar. 1952. 12p. (UCRL-1743)

Rabbits fed inositol and cholesterol developed all classes of serum lipoproteins at the same rate as controls fed cholesterol only. Octadecyl alcohol feeding was without effect on the lipoproteins of a normal rabbit. In a rabbit simultaneously fed cholesterol and octadecyl alcohol results were similar to those obtained with any fat.

3483

CARBON-14 DATES AND ARCHEOLOGY. Frank H. H. Roberts, Jr. Trans. Am. Geophys. Union 33, 170-4(1952) Apr.

The development of a method based on the half life of radiocarbon whereby the age of certain objects can be determined through a series of laboratory tests has provided the archeologist with a time scale which is a valuable aid in placing various types of remains in their proper chronological position. Although the standard deviations in some cases are relatively large, the approximate age indicated is very helpful. Thus far, it has been found that the method is applicable for periods of from 1000 to 25,000 years before the present. Materials from various archeological sites tested by the C^{14} method have shown human occupation in the New World to go back as far as approximately 10,000 years before the present. There are intervening stages between 8000 and 8500 years, others centering around 7000 years, with the largest group of dates falling in the 4000- to 5000-year category. The intervals of several hundreds of years in some cases may mean that sites which belong there have not been found or they may indicate a break in occupation with recurring waves of migration. The C^{14} dates definitely show that beginning about 1500 B.C. there was a marked increase in the population and that it continued to expand until the arrival of the white man. (auth)

RADIATION EFFECTS

3484

Cancer Research Inst., New England Deaconess Hospital, Boston

THERAPY OF ACUTE RADIATION HYPOTENSION IN THE RAT, by P. O'B. Montgomery and Shields Warren. [nd] 7p. (AECU-1992)

The blood pressure of rats made hypotensive by 1500 r of total-body irradiation is raised to normal by L-norepinephrine bitartrate monohydrate, while the response to transfusion is poor and little better than the result of no therapy at all. (auth)

3485

Cancer Research Inst., New England Deaconess Hospital, Boston

EFFECTS OF ACUTE RADIATION ON THE ADULT MAMMALIAN CENTRAL NERVOUS SYSTEM, by Samuel P. Hicks and Philip O'B. Montgomery. Cancer Research Inst., New England Deaconess Hospital, Boston and Laboratory of Pathology, Harvard Cancer Commission. [nd] 15p. (AECU-1994)

Irradiation of rats and mice resulted in acute necrosis of scattered oligodendroglia cells, subependymal cells when present in younger adult animals, retinal rod cells, and neurons in the pyramidal lobe and olfactory brain. Subependymal cells were radiosensitive (200 r) but the other cells were not destroyed below 1200 r. These destructive lesions may indicate that reversible changes occur at lower dose levels and account for some of the functional nervous system changes sometimes observed after irradiation. The findings were related to other data on concomitant changes in cell metabolism and radiosensitivity that occur as the nervous system develops. (auth)

3486

Argonne National Lab.

STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS; VII. CELLULAR RESPIRATION, CELL DIVISION AND IONIZING RADIATIONS, by E. S. Guzman Barron and S. Louise Seki. Mar. 1952. 11p. (AECU-2000; UAC-547)

On x-irradiation of the eggs and sperm of *Arbacia punctulata* there was inhibition of respiration with relatively large doses, whereas there was an increase with small doses. The dose required to produce an increase of respiration depended on the degree of sensitivity of the cell to the effect of ionizing radiation. Sperm cells were most sensitive; then came fertilized eggs; unfertilized eggs were the least sensitive. The inhibiting effect of x rays on cell division was observed even on irradiation with x-ray doses which produced an increase of respiration. These results are compared to similar effects produced by thiol reagents and are attributed to oxidation of the thiol compounds in the cell. (auth)

3487

Argonne National Lab.

THE EFFECT OF X RAYS ON THYMOCYTES AND ITS MODIFICATION BY CYSTEINE, by H. M. Patt, M. E. Blackford and R. L. Straube. Mar. 1952. 17p. (AECU-2001; UAC-541)

Sensitivity of rabbit thymocytes to x irradiation in vitro is decreased by a constant factor over a wide dosage range when cysteine is added to the suspension. Protection depends upon cysteine concentration and time of administration but is not a simple function of the sulfhydryl level. There is a definite postirradiation effect of cysteine which can be accounted for only in part by the persistence of toxic substances in the medium. The relative resistance of packed cells and the failure of cysteine to protect them may be a consequence of anoxia. It is suggested that the effect of cysteine on irradiated thymic cell suspensions may be a result of competition with cell substrates for oxygen, but that the binding of oxygen per se is not necessarily the decisive event in the protection. The results are discussed in connection with related observations in the intact animal. (auth)

3488
Philadelphia General Hospital
INFRARED SPECTRA OF THE BRAIN AND LIPIDS, by H. P. Schwarz, H. E. Riggs, C. F. Glick, J. McGrath, W. Cameron, E. Beyer, E. Bew, Jr., and L. Trombetta. [nd] 3p. (AECU-2013)

Comparison of infrared spectra of sections of brain tissue from adult and fetal rats showed significant differences in the low frequency region. An investigation of the role of lipids in producing the characteristic spectra indicated a considerable smaller amount of a free lipid fraction in developing brain. Irradiated adult rats showed a significant lowering of the free lipid fraction while irradiated fetal rats showed a definite increase of that lipid fraction as compared with nonirradiated controls. It is suggested that this may help to explain the greater radiosensitivity of fetal brain.

3489
Atomic Energy Project, Univ. of Rochester
BIOLOGICAL EFFECTS OF IONIZING RADIATION, by M. Ingram, W. B. Mason, G. Hoyt Whipple, and Joe W. Howland. Mar. 7, 1952. 76p. (UR-196)

This report presents a review of present knowledge and concepts of the biological effects of ionizing radiations. Among the topics discussed are the physical and chemical effects of ionizing radiations on biological systems, morphological and physiological changes observed in biological systems subjected to ionizing radiations, physiological changes in the intact animal, latent changes following exposure of biological systems to ionizing radiations, factors influencing the biological response to ionizing radiation, relative effects of various ionizing radiations, and biological dosimetry.

3490
Naval Radiological Defense Lab.
THE SENSITIVITY OF IRRADIATED RATS TO CONDITIONS OF LOW OXYGEN TENSION AT REDUCED BAROMETRIC PRESSURES, by D. J. Kimeldorf and B. D. Newsom. Mar. 11, 1952. 18p. (USNRDL-340)

A study was made of the tolerance of irradiated animals to several degrees of hypoxia after irradiation. The survival of rats subjected to low oxygen tension under reduced barometric pressures was not altered by previous exposure to x rays under the conditions of the present study. As measured by the mortality rate, the hypoxic tolerance of the irradiated rats was similar to that of nonirradiated rats regardless of the dose of radiation received or the length of time between irradiation and exposure to hypoxia. Data were also obtained indicating that females are more resistant to hypoxia than males. Heavier animals are more resistant to hypoxia than lighter weight animals. (auth)

3491
PRESENT TENDENCIES IN INTERPRETATION OF CELLULAR RADIATION INJURIES. P. De Plaen. J. belge radiol. 35, 113-29(1952) Jan. (In French)

The nuclear-chemical, histological, and genetic changes produced in cells by ionizing radiation are discussed in terms of current explanations of radiation effects.

3492
A CONSIDERATION OF THE PROBLEM OF THOROTRAST DAMAGE. Albrecht Struppler. Deut. med. Wochschr. 77, 311-12(1952) Mar. 7. (In German)

The total radiation by the radiographic contrast medium thorotrast (colloidal ThO_2) might after many years amount to several thousand r units. A clinical description is presented of a 37-yr-old woman who 23 yr before had undergone arteriography with the injection of 30 cc of thorotrast into both carotid arteries for the purpose of localizing a cerebellar tumor, later successfully removed. After 21 yr the patient had developed a jaw swelling due to thorotrast deposition, and particles of thorotrast were widely distributed in liver, spleen, lymph nodes, and thorax and cranial passages. Associated depression, paroxysmal hypertension, and reduced resistance were noted. These effects are attributed less to α radiation, effective only from the surfaces of the thorotrast, than to mechanical action of the particles.

3493
PHOTOMETRIC MEASUREMENT OF THYMONUCLEIC ACIDS OF THE NUCLEI OF IRRADIATED CANCEROUS CELLS. Lucien Mallet and Pinsky-Moore. Acta Unio Intern. contra Cancrum 7, 860-3(1952). (In French)

The value of the Feulgen staining method in measuring the variation of thymonucleic acids in cancerous nuclei and nuclei modified by radiation is discussed. A simple photometric method for quantitative determination of the staining is described. Either an extinction procedure or comparison with the blackening of a corner of a photographic film is used.

3494
THEORETICAL CONSIDERATIONS AND EXPERIMENTAL RESULTS ON THE ACTION OF THORIUM X AND OTHER SUBSTANCES ON ENZYME ACTIVITY. INVESTIGATION IN THE HYALURONIC ACID–HYALURONIDASE SYSTEM. Ch. Wilberg. Ärztl. Wochschr. 7, 127-9(1952) Feb. 8. (In German)

A brief discourse on the action of hyaluronidase in various joint diseases and bone metastases, the difference in pH between sound and diseased joints and its effect on hyaluronidase activity, and the enzyme-inhibiting action of ThX (Ra^{224}), steroids, vitamins C and P, etc. is presented.

3495
SOME SUBSTANCES WITH REDUCING ACTION (CYSTEINE, THIOGLYCOLIC ACID, ASCORBIC ACID, COMBINED CYSTEINE AND ASCORBIC ACID) AS PROTECTIVE AGENTS IN BIOCHEMICAL X-RAY INJURIES. Enrico Caffaratti. Radioterapia radiobiol. e fis. med. 4, 378-84(1951). (In Italian)

Mice, weight 20 g, age 30 to 35 days, were injected intravenously with 500 mg of cysteine/kg, 540 mg of thioglycolic acid/kg, 100 mg of ascorbic acid/kg, or 500 mg of cysteine + 100 mg of ascorbic acid/kg 5 min before irradiation with 800 r (5-week LD_{80}) of 180-kv x rays. The mutal protective action of the cysteine and ascorbic acid was marked, 94% of the mice so treated being alive 3 weeks after irradiation, in contrast to 45, 80, 50, and 50%, respectively, of control and cysteine-, thioglycolic acid-, and ascorbic acid-treated mice.

3496
RECOVERY OF THE FUNCTION OF DENERVATED LIMBS OF AXOLOTL FOLLOWING X IRRADIATION. K. F. Galkovskaya. Daklady Akad. Nauk S.S.S.R. 81, 945-8(1951). (In Russian)

Limbs of live axolotls were denervated and exposed to 15,000 or 20,000 r of 160-kv x rays. Graphs of recovery in terms of reaction to acid, raising of limbs, and mobility are presented. The irradiation retarded recovery and did not stimulate nerve regeneration.

3497
CHANGES IN CELLULAR COMPOSITION OF THE LYMPH CAUSED BY IONIZING RADIATIONS. M. H. Ross, J. Furth, and R. R. Bigelow. Blood 7, 417-28(1952) Apr.

Erythrocytes appear in large numbers in the lymph of rats and dogs after massive exposure to x rays. The peak of endothelial fragility, as indicated by the erythrocyte counts in the lymph, is reached on the ninth to fourteenth day in rats and the eleventh to seventeenth day in dogs. In both species the erythrocyte count in the lymph frequently exceeds one million. Diversion of erythrocytes into the lymph compartment causes a relative anemia; excessive destruction of erythrocytes, presumably related to extravasation and not to a direct irradiation injury, is responsible in part for the absolute anemia. It is suggested that similar changes may contribute to the anemia of leukemia and other blood diseases associated with capillary fragility. The drop in lymphocyte counts in both lymph and blood is precipitous within 5 to 10 hours after irradiation. During the fourth to eighth hours after irradiation, injured and dead lymphocytes are present in the lymph in large numbers. During the recovery phase, the per cent of large lymphocytes in the lymph greatly increases, there are many abnormal large lymphoid cells and mitotic figures, and tissue mast cells appear in blood smears. It is concluded that diversion of erythrocytes into the lymph caused by massive irradiation, if severe, becomes a self-aggravating process and leads to death. (auth)

3498

PRODUCTION AND CHARACTERISTICS OF HYPOPHYSEAL TUMORS FOLLOWING HIGH DOSAGES OF I^{131} IN MICE. Aubrey Gorbman. Acta Unio Intern. contra Cancrum 7, 831-3(1952).

Mice of 3 inbred strains were given thyroid-lethal doses of radioiodine, or doses which allow survival of fragments of thyroid tissue. Ninety per cent of such animals surviving eight months after the single subcutaneous injection had pituitaries at least five times normal in size. The average was a sixteen-fold enlargement. Tumors as large as 250 mg (control 2.0 mg) were obtained. Tumors were found in all three strains, and in both sexes with approximately the same frequency. Age at time of injection was not a factor in incidence of the growth. The tumors were made up of enlarged chromophobic cells and seemed to be derived from both basophils and chromophobes of the normal pituitary. Some small acidophils persisted even in animals lacking thyroid glands, and were restricted to areas at the edge of the tumor. Some of the metabolic and endocrine disturbances which accompany growth of the pituitary tumor have been studied are discussed. (auth)

3499

THE LOCALIZATION OF RADIO-PHOSPHORUS IN SOFT TISSUES WITH RESULTING DESTRUCTION. B. Grad, C. E. Stevens, and C. P. Leblond. Acta Unio Intern. contra Cancrum 7, 534-8(1952)

Male and female albino rats were injected with a single large dose of P^{32} and were sacrificed at various intervals from 5 minutes to 10 days later. The tissues were fixed in Orth fluid. Histological sections of the tissues were examined for radiation damage, and their P^{32} content was detected by the radioautographic technique. The destructive effects of P^{32} were intense only in some of the tissues with a high P^{32} content, e.g., hemopoietic tissues, intestinal crypts and ovarian follicles. In all organs and tissues with a low P^{32} content, little or no destructive effect occurred, e.g., pancreas, nervous tissue. However some tissues with a high P^{32} content showed no destructive action, e.g., liver and kidney. (auth)

RADIATION HAZARDS AND PROTECTION

3500

Naval Radiological Defense Lab.

DECREASED X-RAY SENSITIVITY OF MICE FOLLOWING ADMINISTRATION OF ETHANOL, by L. J. Cole and M. E. Ellis. [nd] 19p. (USNRDL-341)

A single pre-irradiation intraperitoneal injection of 1.25, 2.5, or 3.75 ml of 25 per cent ethanol per 100 g body weight reduced the mortality of mice exposed to mid-lethal and supralethal whole-body x irradiation. Thus, after exposure to 750 r, 84 per cent of 19 mice which had received 3.75 ml of 25 per cent ethanol were alive at 30 days, whereas none of 24 control animals survived. Similarly, of 25 ethanol-treated (3.75 ml of 25 per cent ethanol) mice exposed to 850 r, 36 per cent were alive at 30 days, while none of the controls survived. Within the limits of ethanol dosage studied, the degree of radiation protection at 750 r is a linear function of the amount of ethanol administered. The estimated LD_{50} for mice receiving 3.75 ml of 25 per cent ethanol per 100 g was 814 r, compared with an LD_{50} of approximately 620 r for control mice. Pretreatment of x-irradiated rats with ethanol, in doses equivalent to those which protect mice, failed to elicit any radiation protection. The hypothesis relating the protective action of ethanol to its potentiating effect on catalase activity is discussed. (auth)

3501

TESTING DIAGNOSTIC EQUIPMENT WITH DOSAGE MEASUREMENTS. H. Chantraine and H. Pychlau. Fortschr. Gebiete Röntgenstrahlen 76, 535-8(1952) Apr. (In German)

Tests made with a dosimeter on the irradiation beam intensity of high-tension (60- to 90-kv) x-ray diagnostic equipment of various manufacture are reported. Even in leading clinics and hospitals the equipment was too often found in disorder, uncalibrated, and dangerous. Use of a dosimeter to detect improper tube voltage or amperage is recommended.

3502

THE PROTECTIVE ACTION OF FLAVONOIDS AGAINST RADIATION. I. Arons, B. Sokoloff, and R. Dutcher. Acta Unio Intern. contra Cancrum 7, 803-9(1952).

A flavonoid compound consisting of four identified substances and identical to the original vitamin P of Szent-Gyorgyi, gave considerable protection against injury to the capillary system to rats submitted to a total-body near-lethal dosage of x ray. The mortality rate from radiation injury was reduced to 10% as against 80% of mortality among the control. Thirteen patients submitted to deep x ray therapy and treated with the flavonoid compound manifested a decrease in the severity of reaction of the skin to radiation. (auth)

RADIATION SICKNESS

3503

CURRENT CONCEPTS OF THERAPY OF THE RADIATION SYNDROME. Joe W. Howland. J. Missouri State Med. Assoc. 49, 425-9(1952) May.

A brief discussion as to the nature of the radiation syndrome is given. Specific comment is made on certain signs and symptoms of definite importance in correct therapy. A discussion of the procedures and agents effective at the present time in modification of the radiation syndrome is given. These are analyzed briefly as to probable physiologic effects. An outline of the present day concepts of correct therapy of the radiation syndrome includes the use of rest, antibiotics, careful nursing care and whole-blood transfusion. (auth)

RADIOGRAPHY

3504

HISTOLOGICAL DETECTION OF RADIOACTIVE ELEMENTS WITH LIQUID PHOTOGRAPHIC EMULSIONS SPREAD IN LAYERS. L. F. Belanger. Acta Unio Intern. contra Cancrum 7, 810-13(1952). (In French)

A new radioautographic method, called the "inversion" method, by which radioactive P uptake by bone and teeth can be determined, is described briefly. After the emulsion has been exposed, the histological section can be easily stained. Location of radioactive foci at the cellular level is possible.

RADIOTHERAPY

3505

RECENT ADVANCES IN THE TREATMENT OF POLYCYTHAEMIA VERA. John D. Abbatt. Practitioner 168, 243-8 (1952) Mar.

A treatment technique of polycythaemia vera employing radiophosphorus is described, and the general objections to this form of treatment are discussed briefly, as are the rationale and relative merits of the alternative methods. While radiophosphorus does not correct the initial disorder—the nature of which is still unknown—there are grounds for the belief that a method of control, simpler, pleasanter, at least as safe, and probably more effective than any hitherto employed is now available. (auth)

3506

UTILIZATION OF P^{32} IN SEVERAL CASES OF HODGKIN'S DISEASE. R. Huguenin, R. Saracino, and J. Guelfi. Bull. assoc. franç. étude cancer 38, 414-22(1951). (In French)

Five case histories of Hodgkins's disease treated with x radiation and P^{32} are reported. The radiotherapeutic effect is related to the age and condition of the glandular and pulmonary involvements.

3507

RADIOACTIVE COLLOIDAL GOLD; EXPERIMENTAL AND CLINICAL STUDY. André Herve and Jacques Closon. J. belge radiol. 35, 130-49(1952) Jan. (In French)

A colloidal (70-A particles) suspension of Au^{198} containing 300 mc/50 mg of Au and a 10% gelatin suspension of this in physiological serum were prepared. Tissue distribution and elimination of these suspensions following intravenous and intraperitoneal injection in rabbits is illustrated. The significent concentration in the liver, spleen, soft bone, and, to a lesser degree, in the lung was considerably reduced by the presence of the gelatin. Elimination in either case was negligible. Clinical observations on 10 patients with abdominal carcinomatosis and two patients with pleural metastases treated with the Au^{198} suspensions are outlined. Tissue distribution of activity observed on autopsy of one patient dying 3 weeks after treatment is detailed.

3508

AUTORADIOGRAPHIC INVESTIGATION OF THORIUM PREPARATIONS (PETEOSTHOR). Rudolf Bachmann, Eberhard Harbers, and Karlheinz Neumann. Anat. Anz. 97, Suppl., 154-63(1950-51). (In German)

Peteosthor is an α-emitting ThX (Ra^{224}) preparation with platinsol and eosin being considered for therapy of tumors and tuberculosis. Its uptake and activity in rabbit vertebrae, liver, spleen, and other tissues, and mouse kidney is illustrated by macro and micro radioautographs. Techniques of tissue preparation and film exposure and development are discussed.

3509

PRESENTATION OF A CASE OF BASEDOW'S DISEASE TREATED WITH I^{131}. J. Ducuing, P. Marquès, A. Bru, and G. Espagno. J. radiol. électrol. 33, 35-7(1952). (In French)

Changes in metabolism, thyroid size, fixation of I^{131} by the thyroid, body weight, and other clinical signs during treatment with I^{131} of a 56-yr-old woman for hyperthyroidism are reported. The doses used were 2.5 mc initial, 4.0 mc after 2 days, and 2.0 mc after 1.5 months.

TOXICOLOGY STUDIES

3510

THE RENOTROPHIC POWER OF TESTOSTERONE PROPIONATE. II. TESTOSTERONE PROPIONATE AND EXPERIMENTAL NEPHROSIS BY URANIUM NITRATE IN THE RAT. L. Ballerio. Arch. ital. urol. 25, 145-58(1952). (In Italian)

Microphotographs of kidney damage in rats injected with either or both 0.2 cc of 0.1% uranyl nitrate and 0.5 mg testosterone propionate are presented. A hormonal protective or reparative power could not be demonstrated because of discordant results; the possibility of such power is discussed.

3511

DUST-CAUSED LUNG CHANGES IN GRAPHITE WORKERS. Horst Müller. Fortschr. Gebiete Röntgenstrahlen 76, 452-9(1952) Apr. (In German)

According to clinical and x-ray examinations of 53 graphite workers it is proved that pneumoconioses may be initiated by graphite dust. The influence of the graphite dust during decades may lead to cavities by melting down of pneumoconiotic callosities. These become filled with pitch-black fluid. So far it has not been clarified whether these pneumoconiotic changes are brought forth by the admixed clay, by the small amount of ash silicate, or by pure carbon. Graphite pneumoconiosis should be acknowledged as a compensable disease. (auth)

TRACER APPLICATIONS

3512

Sloan-Kettering Inst. for Cancer Research

EFFECT OF NITROGEN MUSTARD ON NUCLEIC ACID METABOLISM, by David A. Goldthwait. [nd] 11p. (AECU-2003)

The effect of nitrogen mustard on the incorporation of C^{14}-formate and N^{15}-adenine into the bases of pentose nucleic acid (PNA) and desoxypentose nucleic acid (DNA) of small intestine and into the bases of PNA of liver of the rat has been investigated. The drug decreased the incorporation of both precursors into adenine of DNA of intestine to approximately the same extent. This suggests that the drug does not affect specifically the synthesis of the purine skeleton. The drug led to a marked decrease of isotope levels in the bases of DNA of small intestine, but little or no change in the levels in PNA bases of both small intestine and liver. (auth)

CHEMISTRY

3513

Argonne National Lab.

STABILITY OF SOLVATES OF URANYL NITRATE IN NON-POLAR SOLVENTS, by H. M. Feder, L. Ross and R. C. Vogel. Mar. 1952. Decl. Apr. 25, 1952. 4p. (AECD-3367; ANL-SL-548)

The formation of weak molecular addition compounds in inert non-polar solvents has been studied in a new manner. The reactions between uranyl nitrate and weak organic bases have been characterized and the equilibrium constants evaluated. The experimental method previously applied to aqueous systems consists of the measurement of the solubility of uranyl nitrate dihydrate in ethylene dichloride solutions of weak bases at concentrations up to 0.3 molal (3 mole %). The solid uranyl nitrate dihydrate was equilibrated at 25.00 ±

0.01°C for twenty-eight and forty-two days. Agreement between these two equilibration times was taken to indicate that equilibrium had been reached. Analysis showed that the solid phases after equilibration were a mixture of uranyl nitrate dihydrate and trihydrate. Thus, in such a system the activity of the water is fixed. The data have been interpreted in terms of anhydrous species in solution, the water dissolved being associated with the solvating agent. (auth)

3514

Ames Lab.

THE DISPROPORTIONATION OF MANGANATE ION; MANGANESE DIOXIDE AS HETEROGENEOUS CATALYST, by Frederick R. Duke. [nd] 7p. (AECU-1973)

The disproportionation of manganate by the reaction $3MnO_4^- + 4H^+ \rightleftharpoons MnO_2 + 2MnO_4^- + 2H_2O$ has been studied kinetically. A long induction period is followed by a more rapid heterogeneous step in which manganese dioxide, the reaction product, plays the role of heterogeneous catalyst. Since the catalysis is specific by MnO_2, the later probably enters chemically into the reaction through MnO_2 and Mn_2O_3 acting as oxidant and reductant for manganate successively. The induction period is believed to involve pentavalent manganese. (auth)

3515

Notre Dame Univ.

BROMINE ATOM CATALYZED REARRANGEMENTS OF THE THREE ISOMERIC BROMOPROPENES (thesis), by Elliott J. Burrell. Aug. 1, 1951. 13p. (AECU-1980)

It was found that thermal bromine atoms produced via the Szilard-Chalmers reaction induce rearrangement of any of the three isomeric bromopropenes to give one or both the other isomers. Under air free conditions rearrangement occurs readily with 2-bromopropene, giving 20% 1-bromopropene and 70% allyl bromide; 1-bromopropene rearranges to give 55% allyl bromide but only 2% 2-bromopropene; allyl bromide gives 5% 1-bromopropene but no 2-bromopropene. (auth)

3516

Brookhaven National Lab.

EQUILIBRIUM IN THE EXCHANGE OF HYDROGEN BETWEEN PHOSPHINE AND WATER, by Ralph E. Weston, Jr., and Jacob Bigeleisen. [nd] 11p. (BNL-1147)

The exchange equilibrium $PH_2D(g) + H_2O(l) = PH_3(g) + HDO(l)$ has been measured at 25°C by the use of dilute sulphuric acid and buffer solutions as a catalyst. From this measurement and the ratio of the vapor pressures of H_2O and HDO the equilibrium constant for the exchange $PH_2D(g) + H_2O(g) \rightleftharpoons PH_3(g) + HDO(g)$ is calculated to be 1.52 at 25°C. The latter experimental value is combined with a theoretical computation of the temperature independent factor of the equilibrium constant to evaluate the difference in the zero point energies of PH_3 and PH_2D. This leads to the equation, which is valid up to about 500°K, $K_g = 0.781 \exp(198/T)$. This equation is in good agreement with calculations based on the spectra of PH_3 and PD_3 and the rule of the geometric mean. (auth)

3517

Ames Lab.

SPECTROPHOTOMETRIC INVESTIGATIONS OF SOME COMPLEXES OF RUTHENIUM. IV. RUTHENIUM REACTIONS WITH THIOSEMICARBAZIDE, 4-PHENYLTHIOSEMICARBAZIDE, AND DIPHENYLTHIOCARBAZIDE, by Ruth Powers Yaffe and Adolf F. Voigt. May 9, 1952. 16p. (ISC-196(Rev.))

A spectrophotometric investigation revealed that the orange-colored complex formed by the reaction of ruthenium with thiosemicarbazide was $Ru(SC(NH)NHNH_2)^{+2}$. 4-Phenylthiosemicarbazide reacted similarly with ruthenium to give the bright red $Ru(SC(NC_6H_5)NHNH_2)^{+2}$. Both the thiosemicarbazide and the 4-phenylthiosemicarbazide behaved as weak acids, liberating a hydrogen ion for each molecule of ligand which entered the complex. At unit ionic strength the thiosemicarbazide complex was found to have a formation constant of 5.6 ± 0.2, while the constant for the 4-phenylthiosemicarbazide complex was 45 ± 2. Diphenylthiocarbazide in the presence of ruthenium was oxidized to dithizone, which in turn complexed the ruthenium, giving a deep-violet colored solution. (auth)

3518

Atomic Energy Project, Univ. of Rochester

PHYSICOCHEMICAL STUDIES OF BERYLLIUM COMPLEXES. IV. ION-EXCHANGE STUDIES OF THE BERYLLIUM-CITRATE COMPLEX, by Isaac Feldman, Jean R. Havill, and William F. Neuman. Apr. 25, 1952. 13p. (UR-198)

Ion-exchange studies show that the only beryllium-citrate complex existing in significant concentrations at pH 4 and below has the molecular formula $Be_1Citrate_1$. At an ionic strength of ~0.15 and at 34°C its dissociation constant, $(Be^{++})(\text{Ionic Citrate})/(Be_1Citrate_1)$, expressed in concentration terms is 0.035 at pH 3 and 0.0056 at pH 4. In the pH range 4.1 to 4.6, $\mu \cong 0.15$, and at 34°C, it appears that there exists the equilibrium, $Be_2Citrate_2 \rightleftharpoons Be_2Citrate_1 + Citrate$, with a concentration-equilibrium constant of 0.012 at pH 4.1 and 0.0020 at pH 4.6. Under these conditions the complex $Be_2Citrate_1$ is positively-charged. Near pH 7 there probably exists an equilibrium between a colloidal beryllium polymer and negatively charged beryllium-citrate complexes having combining ratios of 2:1 and 1:1. (auth)

3519

THE KINETICS OF THE VANADIUM(III)—VANADIUM(IV) EXCHANGE REACTION IN AQUEOUS PERCHLORIC ACID SOLUTION. Sydney C. Furman and Clifford S. Garner. J. Am. Chem. Soc. 74, 2333-7(1952) May 5.

A kinetic study of the exchange of radiovanadium between V(III) and V(IV) in aqueous perchloric acid was carried out, resulting in the following rate law in the concentration range of 0.01 to $0.05\underline{F}$ $V(ClO_4)_3$, 0.01 to $0.05\underline{F}$ $VO(ClO_4)_2$, 0.5 to $2.0\underline{F}$ $HClO_4$ μ adjusted to 2.5 with $NaClO_4$, 25-40°, $R = 4.5 \times 10^{12} \times \exp(-20{,}700/RT) \times [V(III)][V(IV)]/[H^+]$ mole liter^{-1} sec.$^{-1}$. The mechanism suggested for the rate-determining step involves an interaction of the hydrated ions VOH^{+2} and VO^{+2}. The heat and entropy of activation and specific rate constant for this postulated step have been determined. The exchange rate is ~5-10 times greater in 4F NH_4SCN. Several chemical methods of separating V(III) and V(IV) were worked out; a cation-exchange resin used in a chromatographic column gave excellent separations. (auth)

ANALYTICAL PROCEDURES

3520

Chemical Lab., Illinois Inst. of Tech.

THE HYDROGEN FLUORIDE SOLVENT SYSTEM; POLAROGRAPHIC STUDIES, by Alan F. Clifford and George Balog. Aug. 1951. 12p. (AECU-2008)

Polarographic reduction waves have been obtained in liquid HF by use of a dropping Hg electrode and Hg pool reference electrode. Half-wave potentials are quoted for the couples $Cu(Hg)-Cu(H_2O)^{+2}$, $Fe^{+2}-Fe^{+3}$, SO_2-HSO_2F, and $Sn(II)-Bu_3Sn^+$. Waves for couples lying above H in the electromotive series could not be obtained because of the low overvoltage for H discharge in liquid HF. It becomes apparent that it is possible to obtain polarograms in liquid HF with reasonable accuracy and to establish thereby oxidation potentials and other characteristics of reactions occurring in the medium. Half-wave potentials in liquid HF are tabulated. (cf. AECU-1491; NSA 5-4376)

3521

Radiation Lab., Univ. of Calif.

MASS SPECTROMETRIC DETERMINATION OF GAS IMPURITIES SEPARABLE BY CONDENSATION, by Amos Newton. Apr. 3, 1952. 12p. (UCRL-1747)

A method of analysis of non-condensible impurities in condensible gases or condensible impurities in non-condensible gases is presented. The method utilizes an arbitrarily added internal standard of the same type gas as the impurities. The precision of the method as used here is of the order of a few parts per hundred thousand. (auth)

3522

[Atomic Energy Research Establishment, Harwell, Berks] (England)

THE ESTIMATION OF FREE ACIDITY IN SOLUTIONS OF THORIUM NITRATE, by L. Airey. [nd] 6p. (AERE C/M-132)

Direct titration of free acidity in the presence of Th ions is complicated by hydrolysis of the metal as the end point is approached. A method is reviewed which was designed to overcome this difficulty by using Na tartrate as a neutral complexing agent. The application of the technique of conductometric titration to the problem was investigated. Titration curves and data on amounts of acid and Th added and amounts estimated are presented. The accuracy of the method diminished with decreasing acid/Th ratio. Various suggestions for improving the method are discussed.

3523

Tour, Sam, and Co., Inc.

INTERIM TECHNICAL REPORT; RESEARCH AND DEVELOPMENT OF METHODS OF CHEMICAL ANALYSIS FOR TITANIUM METAL AND ITS ALLOYS, by Dennis Ord, Anna Aronson and Peter A. Morrell. Mar. 3, 1952. 77p. (NP-3745; WAL Report No. 401/48/A-8; U21721)

Methods for determining Al, Mo, W, Ta, Nb, Zr, Co, Cu, Ni, and Sn in Ti metals and its alloys were reviewed on the basis of data obtained by a literature survey and a questionnaire survey of governmental and industrial organizations. For Al in concentrations above 2%, a method involving cupferron separation and precipitation as the hydroxide followed by ignition and weighing of the oxide was reported as satisfactory. In initial tests, aluminon (aurin tricarboxylic acid) colorimetric procedures following cupferron separation of interfering elements failed to accurately determine less than 2% Al. The thiocyanate colorimetric method in which the Mo thiocyanate complex is extracted by AcOBu was fairly accurate in determining Mo in concentrations of 0.06 to 4%; determinations, requiring 1.5 hr each, could be made simultaneously. A 6-hr gravimetric procedure was applicable for determining Mo in the 0.3 to 20% range. The Mo was precipitated with H_2S and ignited to the oxide. Double precipitation was necessary in the presence of W. A method for determining W, based on its reported insolubility in HF, was unsatisfactory; W appeared at least partially soluble in HF. Zr in concentrations of 0.1 to 10% was accurately determined by the mandelic acid method. (NRS abst.)

3524

m-CRESOXYACETIC ACID AS A REAGENT FOR THORIUM. SEPARATION OF THORIUM FROM THE RARE EARTHS OF MONAZITE AND FROM URANIUM. M. Venkataramaniah, B. S. V. Raghava Rao, and C. Lakshmana Rao. Anal. Chem. 24, 747-9(1952) Apr.

A method for the separation of thorium from the rare earths by the use of m-cresoxyacetic acid is given. Separation of thorium from technical cerous oxalate is effected, and separations from the mineral monazite and from uranium are given. A method for the estimation of thorium by converting it to ThO_2 is presented.

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

3525

Argonne National Lab.

THE CRYSTAL STRUCTURE OF K_2TiF_6, by Stanley Siegel. Apr. 1952. 4p. (AECU-2016; UAC-556)

This compound is trigonal and the structure is of the K_2GeF_6 type. The unit cell dimensions are: a = 5.715 ± 0.002 A, c – 4.656 ± 0.001 A. Each Ti atom is linked to six F atoms at the corners of a distorted octahedron, with Ti-F = 1.90 A. This leads to a Ti^{+4} radius of 0.58 A. Each K is bonded to twelve F atoms, of which six are at a distance of 2.87 A, three at 2.75 A, and three at 3.08 A. (auth)

3526

Knolls Atomic Power Lab.

THE CRYSTAL CHEMISTRY OF THE VANADIUM COMPOUNDS, by J. S. Lukesh. Mar. 6, 1950. 31p. (KAPL-728)

This compilation of data on the crystal structure of V compounds is divided into two parts. The first includes oxides, halides, sulfides, etc., as well as those compounds, such as vanadium chromate, in which vanadium is the cation. Intermetallic compounds are also included. The second section lists those compounds in which vanadium is associated with the anion. All available data have been included with references.

3527

MODIFICATIONS OF Na_2BeF_4 AND THEIR RELATIONS TO THOSE OF Ca_2SiO_4. Erich Thilo and Friedrich Liebau. Z. physik. Chem. 199, 125-41(1952) Jan. (In German)

Continuing an investigation of the NaF-BeF_2 system and its close analogy to the CaO-SiO_2 system, the autnors report the preparation and high-temperature Debye-camera study of five modifications of solid Na_2BeF_4. Diffraction lines are tabulated, and lattice constants, densities, and transition temperatures are given.

3528

THE FLUORITE PHASE IN THE ZrO_2-CaO SYSTEM. DEFECT STRUCTURE AND OCCURRENCE OF ELECTRICAL CONDUCTIVITY. F. Hund. Z. physik. Chem. 199, 142-51 (1952) Jan. (In German)

Mixtures of $Zr(NO_3)_4$ and $Ca(NO_3)_2$ solutions were evaporated, the NO_2 was driven off, and the remaining active oxides were heated at 1200 or 1460°C for 5 hr. A pure fluorite phase appeared at 1200°C and 10 to 20 mole % CaO; its lattice constant increased with CaO content from 5.1137 ± 0.0007 to 5.1263 ± 0.0010 A. From the lattice constants and pyknometric densities, a structure consisting of a complete cation lattice and a defective anion lattice was deduced. For the mixed crystal with 15.1 mole % CaO, the temperature dependence of the electrical resistance was measured and related to the defect structure.

DEUTERIUM AND DEUTERIUM COMPOUNDS

3529

REACTION OF METHYL RADICALS WITH HYDROGEN AND DEUTERIUM. Sol Davison and Milton Burton. J. Am. Chem. Soc. 74, 2307-12(1952) May 5.

Free methyl radicals produced by photolysis of acetone or acetaldehyde in presence of deuterium or mixtures of hydrogen and deuterium yield various ratios of CH_4 and CH_3D determined by competition for methyl radicals by the different compounds present. By this method the reaction between free methyl and molecular hydrogen is established as $CH_3 + H_2 \rightarrow CH_4 + H$. Separate studies with acetone and acetaldehyde combined with previous work by Trotman-Dickenson and Steacie, Rollefson and Grahame, and Dodd indicate an activation energy of the reaction of methyl with hydrogen >13 kcal and a steric factor of the order of 10^{-2}. The similar reaction with deuterium has an activation energy ~1 kcal greater. (auth)

FLUORINE AND FLUORINE COMPOUNDS

3530

National Bureau of Standards

THERMAL PROPERTIES OF FLUORINE COMPOUNDS; HEAT CAPACITY, ENTROPY, HEAT CONTENT AND FREE ENERGY FUNCTIONS OF CARBON DIFLUORIDE, CARBON TRIFLUORIDE, CARBON TETRAFLUORIDE AND DIFLUOROACETYLENE IN THE IDEAL GASEOUS STATE, by Rita M. Potocki and David Emerson Mann. Feb. 15, 1952. 59p. (NBS-1439; U21669)

Heat capacity, heat content, ΔS, and ΔF functions based in part on estimated molecular constants are given to the rigid-rotator harmonic-oscillator approximation for CF_2, CF_3, CF_4, and C_2F_2 in the ideal-gas state between 50 and 5000°K. Evaluation of the thermal functions is based on spectroscopic data of Andrews and Barrow (Proc. Phys. Soc. (London) A64, 481(1951)) and thermal values of Haar and Beckett (TIP U20677) for CF and data of Venkateswarlu (Phys. Rev. 77, 676(1950)) and Laird et al. (Trans. Faraday Soc. 46, 803(1950)) for CF_2. Structures of the 4 compounds are discussed; vibration frequencies are given. Methods of evaluating anharmonicity corrections are reviewed, and anharmonicity constants are assigned. Equilibrium constants are listed for 22 possible reactions at 300 to 5000°K; heats of formation are presented for representative minimum, intermediate, and maximum values for the equilibrium constant of each reaction. (cf. TIP U21189) (NRS abst.)

RADIATION CHEMISTRY

3531

Notre Dame Univ.

RADIATION CHEMISTRY OF PURE ORGANIC COMPOUNDS: BENZENE AND BENZENE-d_6, by Sheffield Gordon and Milton Burton. [nd] 30p. (AECU-1970)

In radiolysis of pure liquid C_6H_6 and of pure liquid C_6D_6, by 1.5-Mv electrons, yields of gaseous products are $G(H_2) = 0.035$, $G(C_2H_2) = 0.020$ and $G(D_2) = 0.0117$, $G(C_2D_2) = 0.0133$. Results of radiation chemistry as well as of mass spectrometric measurements indicate two mechanisms of decomposition; by bond rupture and by rearrangement. In a mixture the C_6H_6 and C_6D_6 protect each other against radiation. The general concept of protection is discussed in the light of these results.

3532

Notre Dame Univ.

ELEMENTARY PROCESSES IN RADIATION CHEMISTRY. III. CHARGE TRANSFER MECHANISMS, by John L. Magee. [nd] 22p. (AECU-1982)

The mechanism of transfer of positive charges from an ion to a neutral molecule or atom is considered. The resonant process may have a large cross section since the momenta of the heavy pair (ion and molecule) do not have to change as the electron jump occurs. In the case of molecular ions there is a restriction imposed by the readjustment of the interatomic separations and vibrational frequencies. In quantum mechanical language the various overlap integrals appear in the transition probability. The non-resonant process is formally equivalent to a quenching reaction. For it to be possible, two potential curves of the system $(A + B)^+$ must cross. The potential curves contain the vibrational energy of the system and so the charge transfer will in general be accompanied by vibrational excitation. A special case of this excitation is dissociation of one of the molecules. The possibility for an adiabatic charge transfer exists when chemical reaction occurs. The use of the charge transfer mechanism in radiation chemistry is discussed briefly. (auth)

3533

Notre Dame Univ.

CHARGE NEUTRALIZATION BY REACTION BETWEEN POSITIVE AND NEGATIVE IONS, by John L. Magee. [nd] 29p. (AECU-1983)

The mechanism of reaction between positive and negative ions is examined for application to polyatomic ions of interest in radiation chemistry. It is found that polyatomic ions are expected to have larger neutralization cross sections and a greater diversity of products than corresponding atomic cases. Metathetical processes of the type $A^+ + B^+ \rightarrow C + D$ are not expected to occur. Estimates of the cross sections for neutralization of O^+ by O^- and by O_2^- are made. (auth)

3534

PILE-IRRADIATED CYSTINE. Maria Lipp and Helmut Weigel. Naturwissenschaften 39, 189-90(1952) Apr. (In German)

Cystine was irradiated with slow neutrons in the Harwell pile, and then was highly purified by several precipitations and successive transformations to benzylcysteine, cysteine, and cystine. As expected from the high recoil energy of the $S^{34}(n, \gamma)$ product, no S^{35} was found in the purified product. This is contrary to the conclusion of Ball et al. (J. Biol. Chem. 177, 81(1949); NSA 2-1125) that the S^{35} activity remained in the cystine.

RADIATION EFFECTS

3535

EFFECT OF ELECTRONS ON PHOTOGRAPHIC FILM. S. G. Grenishin. Zhur. Tekh. Fiz. 22, 33-9(1952) Jan. (In Russian)

The interaction mechanism of electrons of moderate energy (25 to 50 kev) on photographic films of high and low sensitivity is discussed. Graphs of the relation between film density and development time for the various conditions are presented.

RARE EARTHS AND RARE-EARTH COMPOUNDS

3536

THE VAPOR PHASE HYDROLYSIS OF RARE EARTH HALIDES. I. HEAT AND FREE ENERGY OF THE REACTION: $LaCl_3(S) + H_2O(g) = LaOCl(S) + 2HCl(g)$. C. W. Koch, A. Broido, and B. B. Cunningham. J. Am. Chem. Soc. 74, 2349-51(1952) May 5.

The equilibrium constant for the hydrolysis of solid $LaCl_3$ by water vapor has been investigated as a function of temperature in the range 730-895°K. These data, combined with a ΔC_p equation for the reaction of $-2.79 - 0.36 \times 10^{-3}T + 0.44 \times 10^5 T^{-2}$, give the following thermodynamic constants: $\Delta H_0 = 27.9$, $\Delta H_{298} = 27.0$, and $\Delta H_{785} = 25.6$, all in kcal $mole^{-1}$; $\Delta S_{298} = 33.5$ cal $mole^{-1}$ $deg.^{-1}$, and $\Delta S_{785} = 30.8$ cal $mole^{-1}$ $deg.^{-1}$. (auth)

3537

THE AMALGAMS OF LANTHANUM. Aldo Iandelli and Riccardo Ferro. Atti accad. nazl. Lincei, Classe sci. fis. mat. e nat. (8) 11, 85-93(1951) July-Aug. (In Italian)

Preparation of amalgams of La containing up to 90% Hg by direct reaction of the elements is described. The compounds $La_3Hg(?)$, LaHg, $LaHg_2$, $LaHg_3$, $LaHg_4$, and one or more with higher Hg content were found. Powder-diffraction photographs of four of these gave the following cell constants: LaHg, body-centered cubic, a = 3.837; $LaHg_2$, hexagonal, type C32, a = 4.948, c = 3.633; $LaHg_3$, compact hexagonal, a = 3.404, c = 4.951; $LaHg_4$, body-centered cubic, a = 10.968. Structure and interatomic distances are discussed. The last three compounds are isomorphous with UHg_2, UHg_3, and UHg_4 (Rundle, Acta Cryst. 2, 148(1949)) except that Rundle's cell constant for UHg_4 must be multiplied by three.

3538

CONDUCTANCES, TRANSFERENCE NUMBERS, AND ACTIVITY COEFFICIENTS OF CHLORIDES OF SOME LOW ATOMIC NUMBER RARE EARTHS IN AQUEOUS SOLUTION. Paul Edward Porter.

The conductances, transference numbers, and activity coefficients of aqueous solutions of the chlorides of La, Ce, Pr, and Nd have been determined for concentrations up to 0.1N. The data for all four rare earths agree with the Onsager limiting law up to about 0.002N. The study indicates that there is a regular decrease in the conductances of solutions of the rare-earth chlorides beginning with Nd.

3539

INVESTIGATION OF LUMINESCENCE OF INTERNAL COMPLEX COMPOUNDS OF SAMARIUM AND EUROPIUM WITH β-DIKETONES. A. N. Sevchenko and A. G. Morachevskiĭ. Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 15, 628-36(1951) Sept.-Oct. (In Russian)

Luminescence spectra of the nitrates, sulfates, acetates, acetylacetonates, benzoylacetonates, and dibenzoylmethanates of Sm and Eu, as crystals and in various solvents at several temperatures, are presented. Spectral lines are tabulated.

SEPARATION PROCEDURES

3540

Knolls Atomic Power Lab.

PROCESSING OF NUCLEAR FUELS, by Edwin L. Zebroski and John F. Flagg. [nd] 22p. (AECU-1962)

Points discussed in this review include the following: reasons for processing spent nuclear fuel; the fuel used and the nuclear reactions which take place in a reactor; the fission products present in the spent fuel; amounts of material processed; reprocessing methods including carrier precipitation, ion exchange, solvent extraction, and volatility processes; the processing plant; and the economics of processing.

3541

Atomic Energy Research Establishment, Harwell, Berks (England)

THEORY OF ION EXCHANGE; II. EQUILIBRIA BETWEEN AN ION EXCHANGER AND AN AQUEOUS SOLUTION WITH A COMMON CATION, by J. F. Duncan and E. Glueckauf. Jan. 1, 1952. 16p. (AERE C/R-809)

The treatment of an ion exchanger as a concentrated aqueous polyelectrolyte is extended to cover the case of an exchanger saturated with a single cation which is in equilibrium with a solution containing a salt of the same cation. For this purpose equations are derived for the activity and osmotic coefficients of mixtures of 1 : 1 electrolytes with resinates giving only one mobile ion per equivalent. Applying these equations to experimental data, values of the "Harned" coefficients α_{12} and α_{21} are calculated. From these the absolute value of the activity coefficient of the H-resinate (using infinite dilution as the standard state) is deduced, which, taken in conjunction with the osmotic data of the previous paper, enable the activity coefficient curve to be obtained, up to very high concentrations. This curve shows that at high concentrations there is less ion pair formation for "resinates" of the sulphonated polystrene type that is shown in aqueous solutions of the corresponding nitrates at the same ionic strength. (auth)

3542

SPECTRAL STUDY OF THE COPRECIPITATION OF VANADIUM BY HYDROXIDES OF IRON, CHROMIUM, AND ALUMINUM ON A SEMIMICRO AND MICROANALYTIC SCALE. F. Burriel-Martí, E. Fernández-Caldas, and J. Ramírez-Muñoz. Anales real soc. españ. fís. y quím. B48, 59-68(1952) Jan. (In Spanish)

In a previous work (Anales real soc. españ. fís. y quím. 46, 37(1950)) the retention of V by the hydroxides of Fe, Cr, and Al was investigated, and it was concluded that these retentions correspond fully to the characteristics of the adsorption process. A similar study has now been carried out at much lower concentrations. The phenomena of coprecipitation were investigated by the techniques of spectral analysis. It is concluded that even for the semimicro and microanalytic concentrations the production of typical phenomena of coprecipitation continues. Al is still the element with the greatest adsorbing power, followed by Cr and finally by Fe.

3543

SEPARATION OF THE RADIOISOTOPES OF SILVER AND PALLADIUM. George Rouser and P. F. Hahn. J. Am. Chem. Soc. 74, 2398(1952) May 5.

A rapid quantitative method for separation of small amounts of the isotope Ag^{111} from large quantities of Pd involved use of aqua regia as solvent. The sides of a test tube were coated with carrier AgNO$_3$ before the Pd sample was added. After dissolution of the sample the Ag was reduced to the metal with ascorbic acid and centrifuged out. Isotopes other than Pd^{111} were reported in the Pd fraction.

3544

SEPARATION OF THORIUM FROM MONAZITE. S. R. Sivarajan. J. Indian Inst. Sci. 34, 1-3(1952) Jan.

Thorium can be separated from chemically similar rare earths in acid solutions of monazite by neutralization with ammonia to the requisite acidity for the precipitation of thorium phosphate. A study is made of the exact conditions under which ammonia can be used. The pH values of equal volumes of acid solution were varied by addition of dilute ammonia solution. Dilute ammonia solutions give better results than concentrated solutions when used for altering the pH. It was found that as the pH increased the percentage yield of thorium increased, and the purity decreased.

3545

A CONTINUOUS AND AUTOMATIC APPARATUS FOR THE SEPARATION AND QUANTITATIVE DETERMINATION OF RARE EARTH ELEMENTS USING ION-EXCHANGE RESINS. Luigi Mazza. Atti accad. nazl. Lincei, Classe sci. fis. mat. e nat. (8) 11, 80-5(1951) July-Aug. (In Italian)

The eluate from the ion-exchange column flows into a gently sloping tube to which are attached a series of flasks, each being filled in order. As each flask is filled hydrostatic pressure prevents mixing of its contents with the eluate stream. Separations achieved with various rare-earth mixtures are shown by graphs.

SORPTION PHENOMENA

3546

Ames Lab.

THE EFFECT OF STEAM ACTIVATION ON MULTILAYER ADSORPTION FROM SOLUTION BY CARBON, by Robert S. Hansen, Robert D. Hansen, and Roy P. Craig. May 5, 1952. 19p. (ISC-216)

The effect of steam activation of the adsorbent on the adsorption of n-caproic acid and n-valeric acid from aqueous solution by carbon black was investigated. Nitrogen adsorption (B.E.T.) surface area measurements showed that two-hour steam activation treatments at 700°C doubled the specific surface area of the carbon black, and at 1000°C trebled it. At a given equilibrium concentration of solute, amounts adsorbed by steam-activated blacks are greater than amounts adsorbed by unactivated blacks for a given weight of adsorbent; the amounts adsorbed are very roughly proportional to the specific surface areas. Primarily, steam activation increases adsorption by increasing specific surface area. Evaluation of the trends in surface excess versus concentration plots indicates that activation increases the specific free surface energy of the adsorbent and pits the adsorbent surface. These indications are further supported by spreading pressure data, activation yields, and electron photomicrographs. Indicated monolayer compositions corresponded to solute molecular areas of 55 to 70 A^2. The amount of water in indicated monolayers was accordingly large in all cases, as reported by Hansen, Fu, and Bartell. The validity of surface areas derived from solution adsorption isotherms by calculations using solute parameters only is again strongly questioned. The multilayer character of adsorption of slightly soluble solutes from aqueous solution by carbon black is retained even under fairly drastic steam activation. (auth)

SPECTROSCOPY

3547

Radiation Lab., Univ. of Calif.

SOME OBSERVATIONS OF THE MASS SPECTRUM OF CO_2, by Amos S. Newton. Apr. 9, 1952. 5p. (UCRL-1757)

The origin of the small but definite mass-32 peak, apparently due to O_2^+, observed in the mass spectral pattern of carefully purified CO_2 was investigated. A check of the variation of masses 32/44 ratio with pressure showed no change. Measurements of a sample of CO_2 enriched in O^{18} indicate that only half of the O of the 32 peak comes from CO_2, the other half arising from source of normal O, which was not identified.

TRACER APPLICATION

3548

RADIOCHEMICAL STUDIES ON FREE RADICALS. A. Hollis and F. A. Paneth. Nature 169, 818(1952) Apr. 12.

RaE(Bi^{210}) was used as the radioactive indicator for a bismuth mirror. A Pb guard mirror, provided with a central variable slit and a small Geiger tube, was used in the reaction tube. The limit to which ethyl radicals reacted on the bismuth mirror was determined, and an accomodation coefficient of 1 was observed. Also the number of free radicals reacting was found.

3549

THE APPLICATION OF RADIOACTIVE TRACERS TO DIFFUSIONAL OPERATIONS. BINARY AND TERNARY EQUILIBRIUM DATA. H. E. Hughes and J. O. Maloney. Chem. Eng. Progress 48, 192-200(1952) Apr.

The applicability of C^{14} to chemical engineering investigations, particularly diffusional operations, is demonstrated. A new device for counting the radioactive emissions from liquid samples which contain C^{14} was developed. Vapor-liquid equilibrium data on the systems CH_3OH-H_2O and CH_3OH-C_2H_5OH were obtained with a modified Othmer still, the CH_3OH being labeled with C^{14}. Liquid-liquid equilibrium data on the system methanol – butanol – water was obtained at 30°C and 1 atm. pressure. Radioactive CH_3OH counts and density determinations were used for sample analyses. Complete component distribution and solubility data were obtained.

URANIUM AND URANIUM COMPOUNDS

3550

Technical Information Service, AEC

GMELIN'S HANDBOOK OF INORGANIC CHEMISTRY; URANIUM AND ISOTOPES; SYSTEM NUMBER 55; by L. Gmelin; translated from 8th German Edition, Berlin, 1936, by Cyrus Feldman. [nd] 164p. (TID-82 (Suppl. 1))

A translation of pages 142 to 221 of the original Gmelin's uranium volume is presented.

3551

WIDTH OF SPECTRAL LINES OF URANYL SALTS AND ITS DEPENDENCE ON TEMPERATURE. B. I. Stepanov. Zhur. Eksptl'. i Teoret. Fiz. 21, 1158-63(1951) Oct. (In Russian)

The effects of various transition and scattering processes on the width of fluorescence lines in crystalline uranyl salts are discussed with regard to lattice changes.

3552

NORMALIZATION OF THE PURITY OF CHEMICAL PRODUCTS FOR ANALYSIS. I: ON THE PURIFICATION OF URANYL ACETATE. F. Burriel-Martí and J. Ramírez-Muñoz. Anales real soc. españ. fís. y quím. B48, 109-12 (1952) Jan. (In Spanish)

It is pointed out that commercial uranyl acetates usually contain small amounts of Na as an impurity, a circumstance which causes certain difficulties in the determination of Na when this reagent is used. The following methods of purification were evaluated: (1) precipitation with H_2S in an ammoniacal medium; (2) precipitation with ammonium sulfide; (3) precipitation with ammonium hydroxide; (4) and double recrystallization. The amount of Na remaining after the purification process was determined by comparison of the spectral lines Na 3302 and Na 3303 (unresolved) with those of standard samples. It is concluded that maximum purification was achieved by method 3, with method 2 also giving satisfactory results.

3553

EFFECT OF ADMIXTURE OF HYDROLYSIS PRODUCTS ON LUMINESCENCE SPECTRA OF CRYSTALS OF URANYL SALTS. B. E. Gordon. Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 15, 624-7(1951) Sept.-Oct. (In Russian)

The combined effects of temperature and the presence of UO_2OH^+ ions and H_2O, SO_3, NO_2, etc., molecules on the luminescence spectra of uranyl nitrate and sulfate crystals are discussed.

3554

ON THE NATURE OF ELEMENTARY PROCESSES OF ABSORPTION AND FLUORESCENCE OF URANYL COMPOUNDS. B. I. Stepanov. Zhur. Eksptl'. i Teoret. Fiz. 21, 1153-7(1951) Oct. (In Russian)

An attempt is made to explain the protracted duration of the fluorescence of uranyl salts. Data on uranyl sulfate, acetate, nitrate, and chloride and K uranyl sulfate and Na uranyl acetate are considered. The transition probability is shown to be related to the degree of imperfection of the crystal lattice.

ENGINEERING

AEROSOLS

3555

Harvard Univ. School of Public Health

AIR CLEANING STUDIES; PROGRESS REPORT FOR FEBRUARY 1, 1950 TO JANUARY 31, 1951, by Melvin W. First, Leslie Silverman, Richard Dennis, Glenn A. Johnson, August T. Rossano, Jr., Ralph Moschella, Charles Billings, Edward Berly, Sheldon Friedlander, and Philip Drinker. June 30, 1951. 222p. (NYO-1581)

This report covers the correlation and study of air and gas cleaning activities at the sites and among the AEC contractors and provides for consultation on problems that arise. A major consideration is the research and development on new methods and devices for air and gas cleaning. The program has as its basic objectives the following items: methods of collection and evaluation of samples, evaluation of commercial air cleaners, correlation and collation of information on air and gas cleaning in all activities, research and development of new equipment, preparation of a practical handbook and training and educational activities for personnel.

HEAT TRANSFER AND FLUID FLOW

3556
Babcock and Wilcox Co.
EROSION AND HEAT TRANSFER WITH LIQUID METALS; PROGRESS REPORT IV, MARCH 16–APRIL 15, 1950, by H. G. Elrod, Jr. and Richard R. Fouse. Apr. 18, 1950. 9p. (NEPA-1377)

Design and construction of an electromagnetic pump is discussed briefly. A charging unit for melting and supplying Li to various tests rigs and a simple inexpensive method of determining liquid levels at various points in the test apparatus are described.

3557
Babcock and Wilcox Co.
EROSION AND HEAT TRANSFER WITH LIQUID METALS; PROGRESS REPORT VII, JUNE 17 - JULY 17, 1950, by H. G. Elrod, Jr. July 17, 1950. 9p. (NEPA-1504)

Procurement, fabrication and erection of test equipment are discussed. No technical information is included.

3558
General Engineering Lab., General Electric Co.
MAGNETIC FLOWMETER OUTPUT POTENTIALS, by E. R. Astley. Mar. 1, 1952. 13p. (R52GL42)

An analytical investigation of the Faraday effect produced by a fluid moving through a magnet field is described. The potential distribution functions which express the potential at any point in the fluid or at any point in the pipe wall are derived. It is concluded that a magnetic flowmeter can be dry-calibrated analytically and give 3% accuracy in the field. It is possible to meter both low- and high-resistivity materials by suitable choice of pipe material.

3559
Argonne National Lab.
APPLICATION OF INDUCTION HEATING TO THE MEASUREMENTS OF HIGH TEMPERATURE PROPERTIES, by R. J. Thorn and O. C. Simpson. Apr. 10, 1952. 21p. (AECU-2009; UAC-551)

Solutions are obtained of the equation for the magnetic field distribution through a material and the equation for the heat flow for an idealized system such as one consisting of a cylinder of conducting material mounted coaxially with an induction coil. The spectral emissivities of graphite and carbon in the temperature range 1285 to 2035°K were found to be independent of temperature. The emissivity of high-purity polished graphite of resistivity about 1120 microhm/cm is 0.769 ± 0.002, and for high-density polished graphite of resistivity 1740 microhm/cm the value is 0.780 ± 0.005. For polished spectroscopic carbon of resistivity 5080 microhm/cm the emissivity is 0.789 ± 0.005. A value of 0.16 cal cm^{-1} sec^{-1} deg^{-1} is obtained for the thermal conductivity of high-purity graphite.

3560
Knolls Atomic Power Lab.
VORTICITY HEAT TRANSFER IN MOLTEN METALS, by R. G. Kennison. Apr. 11, 1952. 27p. (AECU-2010)

The transfer of heat is assumed analogous to the transfer of vorticity for turbulent fluid flow in a long straight pipe. Nusselt numbers are found and compared with other theoretical and experimental information. A simple and purely experimental velocity profile equation providing good correspondence with experimental information down to the laminar sublayer is also found. (auth)

3561
Lewis Flight Propulsion Lab., NACA
INTERNAL FILM COOLING EXPERIMENTS IN 4-INCH DUCT WITH GAS TEMPERATURES TO 2000°F, by George R. Kinney and John L. Sloop. Sept. 21, 1950. 34p. (NACA-RM-E50F19)

An investigation of film cooling was conducted in a 4-inch-diameter duct at gas temperatures from 600° to 2000°F and Reynolds numbers from 400,000 to 1,400,000. The coolants were water and ethylene glycol at flows of 1 to 6 percent of the gas flow. During vaporization of the liquid film, coolants kept the duct wall below the boiling temperature of the liquid; little additional duct cooling was obtained from coolant vapor along. Data were generalized over part of the coolant-flow range by use of heat-transfer relations in a form that facilitates prediction of coolant flow required to film-cool a duct for a desired length when temperature and flow of the hot gas are known. (NACA)

3562
THERMAL CONDUCTIVITY OF INHOMOGENEOUS RODS. A. B. Datsev. Doklady Akad. Nauk S.S.S.R. 82, 861-4(1952) Feb. 21. (In Russian)

Differential equations for linear multilayer thermal conductivity are derived. Solutions for the general and stationary states are expressed in terms of various functions.

3563
DETERMINATION OF THERMAL COEFFICIENTS OF SOLID THERMAL INSULATORS. M. V. Kulakov. Zhur. Tekh. Fiz. 22, 67-72(1952) Jan. (In Russian)

Equations for the coefficients of thermal conductivity in various insulator geometries are given, and necessary conditions of experimental determination of such coefficients are listed.

3564
TEMPERATURE VARIATIONS ON THE SURFACE OF AN INFINITE SHELL UNDER DISCONTINUOUS HEAT FLOW. A. M. Shklover. Zhur. Tekh. Fiz. 21, 1372-8(1951) Nov. (In Russian)

VACUUM SYSTEMS

3565
A HIGH-VACUUM ROTARY SEAL. Edward P French and Acie Newton. Nucleonics 10, No. 3, 66(1952) Mar.

In a device designed to transmit rotary motion to a shaft in a vacuum chamber, driving and driven shafts in axial alignment are each provided with oblique crank extensions. A wobble shaft passes through the center of, and is clamped to, a rubber sealing diaphragm. This shaft, carried at one end in bearings in the driving shaft crank, slants across the axis and with its other end revolves the crank of the driven shaft. Thus the rubber diaphragm needs only flex and has been found to seal a vacuum of 3×10^{-5} mm Hg.

MINERALOGY, METALLURGY, AND CERAMICS

CERAMICS AND REFRACTORIES

3566
EXPERIMENTAL REFRACTORY BODIES OF HIGH-MELTING NITRIDES, CARBIDES, AND URANIUM DIOXIDE. P. Chiotti. J. Am. Ceram. Soc. 35, 123-30(1952) May 1.

A procedure for the preparation of the nitrides and carbides of several metals and the preparation of refractory bodies from them is described. The investigation shows that reasonably strong and dense bodies can be prepared from these materials as well as from UO_2. Evidence showing the tendency of Be_3N_2, TaN, and ThN toward instability at high temperatures is presented. Evidence is also given indicating that the hexagonal structure reported by others for TaN is actually that for Ta_2N. A lattice for Th_2N_3 is proposed. The melting points of ThN, UN, and UC are determined to be 2630 ± 50, 2650 ± 100, and 2590 ± 50°C, respectively. (auth)

CORROSION

3567

New York Univ.

INORGANIC CORROSION INHIBITORS IN ACID SOLUTION, by Cecil V. King, Emil Goldschmidt and Natalie Mayer. Apr. 15, 1952. 12p. (NYO-3462)

In dilute HCl with excess KNO_3 as a depolarizer, Fe, Zn, and Cd dissolve at, or nearly at, a maximum rate controlled by the rate of convection and the speed of diffusion of the H ion. The dissolution rates of these metals may be reduced to comparatively small values by addition of dichromate, molybdate, or tungstate. With very pure Fe and Zn the dissolution rate in the presence of dichromate can be reduced still more by the addition of a soluble fluoride. While none of the solutions used are highly protective, the experiments described are of aid in interpreting the mechanism of inhibition. (auth)

GEOLOGY AND MINERALOGY

3568

Department of Mines and Technical Surveys (Canada).

ELECTRONIC CONCENTRATION OF RADIOACTIVE ORES WITH THE LAPOINTE PICKER BELT, by C. M. Lapointe and R. D. Wilmot. Mar. 10, 1952. 25p. (NP-3827; TR-95/52)

A picker-belt system for the concentration of radioactive ore by electromechanical means is described. Sized rock is carried on a belt under a detector of radioactivity where an electronic device operates to separate ore from waste. Depending on the type of ore, from 40 to 60% of the mine ore may be discarded by this means, with U losses as low as 4%. Its principal application is in treating ore sizes above 1⅜ in. to eliminate or augment hand sorting. A secondary use is in the scalping out of a high grade U product from U ore. The metallurgical efficiency of the picker belt, although limited by the degree of dissemination of the U in the ore, is dependent on the belt speed and on the size of ore treated.

3569

A PRELIMINARY INVESTIGATION INTO THE ISOTOPIC COMPOSITION OF CARBON FROM SOME ALKALINE INTRUSIONS. H. Von Eckermann, H. Von Ubisch, and Frans. E. Wickman. Geochim et Cosmochim, Acta 2, 207-10(1952)

Twelve samples of carbonate rocks from Alnö (Sweden), eight samples from Fen, two from Stjernöy and one from Seiland (Norway), have been investigated. The beforsites from Alnö show a lower C^{12}/C^{13} ratio than the soevites and the alvikites from the same area. In the Fen area there is a difference between the iron-rich and iron-poor rocks. The C^{12}/C^{13} ratios of the soevites from all four occurrences are quite consistent. Various factors which might influence the ratio are mentioned.

3570

ALPHA IONIZATION DAMAGE AS A CAUSE OF LOW HELIUM RATIOS. Patrick M. Hurley. Trans. Am. Geophys. Union 33, 174-82(1952) Apr.

The possibility has been investigated that He atoms escape from the crystal structures of minerals only as these structures become damaged by intense α-particle ionization. The escape of He from zircon and sphene has been found to be almost zero for cases of low α bombardment and increases progressively until almost all of the He is lost in cases where the samples have suffered a bombardment of 10^{16} α/mg. The zircons in granites are well up in the range of activity where this damage will be important so that it is concluded that one of the principal causes of the high loss of He from granitic rocks is the concentration of the radioactive elements and consequently He into centers in which the damage will be great enough for the He to escape. The relationship between He loss and the number of α particles per milligram has been established for zircon and sphene for use in approximate age measurements on these minerals. Theoretical curves have been derived that appear to represent the process fairly well, and permit age estimates to be made even on material that is severely damaged. (auth)

3571

THE METAMICT STATE. A. Pabst. Am. Mineral 37, 137-57(1952) Mar.-Apr.

Some substances, such as gadolinite, euxenite, fergusonite, thorite, zircon, and others, originally crystalline, have in the course of time assumed the properties of amorphous substances. A study of such substances is given. X-ray studies of metamict minerals are reported, and changes induced in metamict thorite by heating are discussed. After prolonged heating all specimens are converted to the monoclinic phase. Isometric ThO_2 always appears at intermediate stages. 48 references.

METALS AND METALLURGY

3572

North American Aviation, Inc.

PREPARATION OF DROSS-FREE SODIUM AND OTHER LOW MELTING METALS AND ALLOYS BY THE UNDER POUR METHOD, by L. Silverman. Issued Apr. 1952. 8p. (NAA-SR-178)

An apparatus has been designed to prepare dross-free Na metal from the manufacturer's sample. The apparatus, which may also be used for other low-melting elements and for alloys, comprises a "ladle" or reservoir having pouring spouts leading from below the liquid surface.

3573

Metallurgical Labs., Dow Chemical Co.

NINTH QUARTERLY REPORT (DECEMBER 1, 1951–FEBRUARY 29, 1952); PREPARATION OF HIGH PURITY MAGNESIUM AND A STUDY OF THE EFFECT OF NON-METALLIC AND ALKALI METAL IMPURITIES ON THE CORROSION CHARACTERISTICS OF PURE MAGNESIUM. [nd] 56p. (COO-88)

Corrosion studies of the Mg-Fe binary system indicate that the corrosion properties are significantly affected by the thermal history during casting. The solution potential measurements of Mg-Fe alloys also were found to show a definite relationship to thermal history. Data on the effects of silicon on corrosion of Mg-Fe-Si alloys and the effects of C on the Mg-C and Mg-Fe-C systems are included. Data on the corrosion properties of Mg-Cl are revaluated. Vacuum sublimation with argon casting was further investigated as a purification method for Mg.

3574

North American Aviation, Inc.

RELATIVE ORDERING RATES IN THE SUPERLATTICE ALLOY AuCu, by P. G. Stello. Issued Apr. 2, 1952. 32p. (NAA-SR-171)

The ordering reaction in AuCu was studied for each of the following disordering treatments: cold work, irradiation and thermal disordering above the critical temperature. Isothermal data were obtained by annealing the specimens for a short period of time, cooling them quickly and measuring their resistance. The resistance served as an index of the degree of order. The cold-worked specimens cannot be treated as if a single activated process governed the reordering. If the rate of ordering of the specimens disordered by radiation can be described in terms of a single activated process, then it must be concluded that irradiation increases the activation energy by as much as 20 per cent, relative to the thermally disordered specimens. (auth)

3575

THERMOELECTRIC POWER OF ALUMINUM IN VERY THIN LAYERS. Jean Savornin and Georges Couchet. Compt. rend. 234, 1608-10(1952) Apr. 16. (In French)

The thermoelectric power of couples formed by a thin layer of 99.995% Al, vaporized in vacuum on a glass plate, and a Cu wire was measured between 0°C and a temperature varying from 0 to 300°C. The power is independent of thickness over the range 10 mμ to 1 μ; its value at 0°C is 4.00 ± 0.10 μv/°C.

3576
REMOVAL OF EMBRITTLING GASES FROM ZIRCONIUM.
W. C. Lilliendahl, E. D. Gregory, and D. M. Wroughton.
J. Electrochem. Soc. 99, 187-190(1952) May.

A process is described for the removal of dissolved oxygen from zirconium by heating the solid metal in molten or gaseous calcium. The equilibrium oxygen-zirconium ratios have been determined as a function of the time and temperature of treating. Nitrogen is not removed in the treating cycle, and contamination of the treated metal with this impurity may occur. This may be prevented by a careful control of treating temperatures. At high treating temperatures the process may be used for the removal of nitrogen from calcium. (auth)

3577
HOW DOES TITANIUM SCALE AT HIGH TEMPERATURES?
P. H. Morton and W. M. Baldwin, Jr. Iron Age 169, 133-8 (1952) May 1.

At 850 to 1000°C a transition from a primary light scale to a black scale was observed with the U. S. Bureau of Mines titanium that has not been reported previously. This oxidation product was composed of five layers and was accompanied by a change from a low scaling rate to a much higher one. Above 1000°C behavior was more complex. Titanium from two other sources was the same in appearance and overall reactions were also similar, except that no transition occurred. (auth)

3578
ARC MELTING OF ZIRCONIUM METAL. H. L. Gilbert, W. A. Aschoff, and W. E. Brennan, II. J. Electrochem. Soc. 99, 191-193(1952) May.

In arc-melting zirconium metal with a tungsten electrode, tungsten appears in nonuniform amounts throughout the ingot. To eliminate this, the use of consumable electrodes of zirconium sponge is proposed. All early attempts to use sponge zirconium electrodes were unsuccessful due to instability of the arc. This problem was solved by stabilizing the arc with a small amount of magnesium metal added to the zirconium sponge used in making up the electrodes. A water-cooled copper sleeve was used as a melting section in the arc-melting furnace. Melting was done under an inert atmosphere of argon or helium. Metallographic and radiographic studies show the finished ingots to be sound. (auth)

3579
SHEATH WORKING OF ZIRCONIUM INGOTS. E. T. Hayes, G. L. Frederic, and E. D. Dilling. Metal Progress 61, 83-6 (1952) May

Zirconium can be worked at temperatures up to 1700°F, but scalping and cleaning losses become excessive. An iron sheath is devised to fit tightly around the zirconium ingot, with plugs welded in the ends. The sheathed ingot is then forged uniformly to a rectangle about 2 × 6 × 9 in. The forged ingot is rolled according to conventional practice, care being taken to hold the side and end loss down. The limiting temperature for sheath-working is 1715°F, above which temperature the two metals cannot be separated.

PHYSICS

3580
Radiation Lab., Univ. of Calif.
PHYSICS DIVISION QUARTERLY REPORT; NOVEMBER, DECEMBER, 1951 AND JANUARY, 1952. Mar. 18, 1952. 43p. (UCRL-1729)

The results obtained on the disintegration of He by 90-Mev neutrons and the development of C^{+6} beams are reported. The design of a gun type radiation target holder is described. Photographs are presented showing the shape of the beam in the 60-in. cyclotron. The photographs were taken to determine the cause for erosion of the upper dee lip. The operation and development of the accelerators are also briefly noted. Progress is reported but essentially no numerical data are given for the following projects: film program; inelastic scattering program; constituent cross sections of carbon for 90-Mev neutrons; nuclear inelastic scattering of 300-Mev neutrons; nucleon momentum distributions in deuterium, carbon, and oxygen inferred from proton scattering; the photoproduction of negative pions from deuterium; proton-deuteron elastic scattering using 345-Mev protons; proton-proton scattering at reduced energies; effect of chemical binding on stopping power; attempt to observe the production of V^0 particles in the synchrotron x-ray beam; meson production; synchrotron studies; and theoretical studies.

3581
North Carolina State Coll.
PROGRESS REPORT NO. 3 COVERING PERIOD JANUARY 1, 1952–MARCH 31, 1952; THE MEASUREMENT OF THERMAL PROPERTIES OF NON-METALLIC MATERIALS AT HIGH TEMPERATURES, by K. O. Beatty, Jr. Apr. 30, 1952. 19p. (ORO-65; Progress Report No. 3)

This project has as its basic objective the construction of a new type of apparatus for measuring the thermal properties of poor conductors at elevated temperatures. Schematic diagrams of the high temperature furnace and circuitry are presented and briefly described. In essence the test assembly consists of a five-layer sandwich. The central layer, made of material of high thermal conductivity, is called the absorber. On each side of the absorber there are slab samples. The top and bottom layer of the sandwich are heating platens. In operation the entire assembly is brought to uniform temperature, t_0, and then, by suddenly increasing the platen temperature, the sample faces in contact with the platens are brought as rapidly as possible to a higher constant temperature, T_0. The temperature, t, of the absorber is then recorded for a period of time and plotted on semilog coordinate paper as log $\frac{T_0-t}{T_0-t_0}$ vs. time. The curve of temperature-time plotted in this manner approaches a straight line after a short interval of time. The slope of this line together with its intercept can be used to calculate all three thermal properties by simple equations. At present, samples about 5 in. in diam. are being used, and the assembly is housed in an outer shell made of 12-in. steel pipe.

3582
Atomic Energy Research Establishment, Harwell, Berks (England)
SEDIMENTATION FROM CONCENTRATED SUSPENSIONS IN RELATION TO PARTICLE SIZE, by E. B. Allison and P. Murray. Nov. 26, 1951. 14p. (AERE M/R-829)

When solid particles settle out of a suspension, the concentration of which is such that "line-settling" is operative, then the process may be regarded as the upward flow of liquid through a porous bed. Furthermore, the fundamental equation for the flow of fluid through a granular bed may be applied to the sedimentation data and, therefore, specific surface values can be obtained. With three out of four refractory oxides tested it was found that the specific surface values calculated from the sedimentation data were ~30% lower than those obtained by the air-permeability method. (auth)

3583
Mound Lab.
REPORT FOR RESEARCH ON URANIUM SALTS, NOVEMBER 5, 1951 TO FEBRUARY 5, 1952, by E. Orban. Mar. 10, 1952. 23p. (MLM-663)

A detailed report is presented on the preparation of uranyl sulfate solutions, on the vapor pressure, and on the viscosity and density at high temperatures and atmospheric pressures. A study of the surface tension is made of uranyl sulfate solutions saturated with oxygen at elevated temperatures and pressures and at low temperatures and atmospheric pressure.

3584
Oak Ridge National Lab.
PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 66p. (ORNL-1164)

Separate abstracts have been prepared for the following sections of this report: Scintillation Spectrometry and Electronic Development, sects.1 and 2; Short-Lived Isomers and Directional Angular Correlation of Successive Gamma Rays, Short-Period Activities, and High-Voltage Accelerator Program, sects.3, 4, and 5; Neutron-Diffraction Studies and A Crystal Spectrometer as a Source of Monoenergetic Thermal Neutrons, sects.6 and 7; and Low-Temperature Physics, Stable-Isotope Cross Sections, and Theoretical Physics, sects.8, 9, and 13.

3585
CERTAIN PROBLEMS IN THE THEORY OF NONHOMOGENEOUS NONISOTHERMAL PLASMA. I. Yu. L. Klimontovich. Zhur. Eksptl'. i Teoret. Fiz. 21, 1284-91 (1951) Nov. (In Russian)

Equations are derived by which the Coulomb interaction of charged particles and their interaction with atoms of a gas can be calculated. The velocity distribution function for electrons is calculated for the case when the electron's effective elastic scattering cross section is inversely proportional to its velocity.

3586
CAUSTIC SURFACES OF ELECTRON LENSES. V. Glazer and G. Gryumm. Zhur. Tekh. Fiz. 21, 1412-26(1951) Nov. (In Russian)

Geometry of focal surfaces of electron lenses with and without diaphragms is discussed.

3587
WAVE-MECHANICAL CALCULATION OF INTENSITY RELATIONS IN REPRESENTATION SPACE OF ELECTRON LENSES. I. CALCULATION OF ELECTRON INTENSITIES FOR OPTICO-GEOMETRIC REFLECTION PROBLEMS. V. Glazer and G. Gryumm. Zhur. Tekh. Fiz. 21, 1427-43 (1951) Nov. (In Russian)

3588
DESIGN OF ELECTRON LENSES WITH THE ASSIGNED REQUIREMENT OF THIRD-ORDER ABERRATION. P. P. Kas'yankov. Zhur. Tekh. Fiz. 22, 80-3(1952) Jan. (In Russian)

Field equations for electron lenses exhibiting third-order aberration are derived.

3589
ON HIGH-FREQUENCY OSCILLATIONS OF ELECTRON PLASMA. A. I. Aksiezer and Ya. B. Faĭnberg. Zhur. Eksptl'. i Teoret. Fiz. 21, 1262-9(1951) Nov. (In Russian)

Interaction of a beam of charged particles with an electron plasma to produce density and velocity oscillations of increasing amplitude is discussed theoretically.

3590
CERTAIN PROBLEMS IN THE THEORY OF NONHOMOGENEOUS NONISOTHERMAL PLASMA. II. TOWARD A THEORY OF THREE-DIMENSIONAL PERIODICITIES IN ELECTRON PLASMA. Yu. L. Klimontovich. Zhur. Eksptl'. i Teoret. Fiz. 21, 1292-1302(1951) Nov. (In Russian)

Equations relating the creation and stability of three-dimensional oscillations to the parameters of an electron plasma are derived.

ASTROPHYSICS

3591
Argonne National Lab.
THE IONIZATION OF GAS MIXTURES IN STELLAR INTERIORS, by Geoffrey Keller and Roland E. Meyerott. Mar. 1952. 31p. (ANL-4771)

A statistical theory of the ionization of heavy atoms in a gas mixture is proposed. Approximations have been made for a mixture which is very rich in hydrogen and helium and for which the temperature is high enough so that these elements are completely ionized, as is the case throughout most of the interior of a star. Contrary to Morse's method, the hydrogen and helium nuclei surrounding a particular heavy nucleus (whose ionization potential is being studied) are not assumed to be separated by certain minimum distances as determined by the radii of their "ion spheres." Instead the surrounding nuclei are assumed to be, like the electrons, distributed statistically, as in the Debye-Hückel theory of strong electrolytes. It is found that the average electrical potential near a heavy ion obeys a generalized Thomas-Fermi equation, and it is shown that under the physical assumptions made above, the exact solutions of the equation are sufficiently self-consistent. It is pointed out that when ionization occurs the new free electron does not effectively go to infinite distances but instead joins the free electron shield around the ion. Consequently, both the effective ionization energy and the statistical weight of the states of the surrounding gas are affected. It is shown that in calculating the relative probability of various states of ionization the correct answer is obtained if one employs the Boltzmann formula, which is correct in the absence of appreciable shielding, and replaces the unshielded ionization potential by one which is corrected for the effect of the shielding on this potential. (auth)

COSMIC RADIATION

3592
ON THE DIURNAL VARIATION OF EXTENSIVE AIR SHOWERS OF HIGH DENSITY AT 3500 m ABOVE SEA LEVEL. C. Ballario, B. Brunelli, A. De Marco, and G. Martelli. Nuovo cimento (9) 8, 587-9(1951) Aug. (In Italian)

Detailed data taken during an experiment previously reported (Phys. Rev. 83, 666-7(1951); NSA 5-6262) are presented and analyzed.

3593
THE ORIGIN OF COSMIC RAYS IN SOLAR OR STELLAR DISTURBANCES. L. Riddiford and S. T. Butler. Phil. Mag. (7) 43, 447-56(1952) Apr.

Charged particles may attain cosmic-ray energy by betatron acceleration in trochoid-like orbits in the varying magnetic fields which occur in star spots. For sunspots, cyclic acceleration produces maximum energies of about 10^{13} ev for protons and 10^{15} ev for heavier particles. If the source of ions is constant, the differential number-energy spectrum of the relativistic particles has the form of an inverse power law. The power in this law is the same for protons and heavier particles, and lies between 1.7 and 3.0 independently of assumptions about the constants of the sunspot. (auth)

3594
ON A NON-ELECTROMAGNETIC-CASCADE PROCESS IN COSMIC-RAY SHOWERS. M. I. Podgoretskiĭ. Zhur. Eksptl'. i Teoret. Fiz. 21, 1097-1108(1951) Oct. (In Russian)

Theoretical and experimental evidence is presented proving that in certain electron-nuclear showers two or more secondary "active" particles arise, which produce in turn secondary electron-nuclear showers. The existence of the nuclear-cascade process is thus demonstrated.

3595
THE NEUTRON COMPONENT OF COSMIC RADIATION. G. Pfotzer. Naturwissenschaften 39, 149-58(1952) Apr. (In German)

Methods of investigating cosmic neutrons, their absorption and scattering processes and relation to other cosmic phenomena, and their connection with C^{14} activity in biological substances are reviewed. 27 references.

3596
APPEARANCE OF HEAVY FRAGMENTS OF HIGH ENERGY IN NUCLEI SHATTERED BY COSMIC RAYS. V. I. Veksler. Doklady Akad. Nauk S.S.S.R. 82, 865(1952) Feb. 21. (In Russian)

The author notes very briefly his belief that the production of heavy fragments (Li, Be, C, O) in high-energy nucleon-nuclei collisions can be explained within the meson theory of nuclear forces.

3597
HIGH ENERGY COLLISIONS WITH THE PRODUCTION OF MESON SHOWERS. S. Biswas and V. D. Hopper. Phys. Rev. 86, 209-11(1952) Apr. 15.

Eighteen events of meson showers produced in high-energy collisions have been analyzed to study the mechanism of the production of mesons. The angles ψ of the mesons have been measured relative to the primary direction or relative to the shower axis for neutron-induced showers. The mean value of cos ψ, $(\cos\psi)_{Av}$, has been plotted against the number of N of the mesons produced. It is found that the observed points can be divided into three regions corresponding to single, double, and triple collisions inside the nucleus. The points representing single collisions lie considerably below the theoretical curve of Heisenberg for completely inelastic collisions and it is concluded that in these collisions only a fraction (1/K) of the incident energy goes to the meson production. For these events the values of K and primary energy E_p have been estimated by applying Heisenberg's theory to partially inelastic collisions. For double- and triple-collision events the number of mesons produced in successive collisions inside the nucleus has been estimated from the angular dispersions of the single-collision events. (auth)

3598
APPLICATION OF THE FERMI MODEL TO COSMIC-RAY EVENTS OF PRIMARY ENERGY GREATER THAN 10^{13} ev. W. E. Hazen, R. E. Heineman, and E. S. Lennox. Phys. Rev. 86, 198-204(1952) Apr. 15.

The Fermi model for nucleon-nucleon collisions at high energies has been used to calculate the energy distribution, the energy dependence of the angular distribution, and the number of emitted pions as a function of primary energy and impact parameter. We calculate the effect on the pion distribution of nucleon-antinucleon production in the same collision. The results approach agreement with air-shower observations. (auth)

3599
SOME OBSERVATIONS ON NEW UNSTABLE HEAVY PARTICLES. Bruno Rossi, Herbert Bridge, and Martin Annis. Atti accad. nazl. Lincei, Classe sci. fis. mat. e nat. (8) 11, 73-6(1951) July-Aug. (In Italian)

Two events observed at Echo Lake, Colo., in a Wilson cloud chamber containing Pb and Al plates are illustrated. One event is interpreted as direct production of a charged V particle in a nuclear reaction and its subsequent decay into a neutral particle and a charged π meson of 60-Mev energy. If the neutral particle was a neutron, the mass of the V particle was 2300 to 2500 m_e, if a meson, 850 to 1100 m_e. The second event is interpreted as a charged V particle coming to rest and then decaying into a high-energy particle. Since the time of passage of such a particle through the chamber is $\sim 10^{-9}$ sec, the half life of the V particle cannot be much less than this.

3600
ON THE EAST WEST ASYMMETRY OF THE HARD COMPONENT OF COSMIC RAYS. B. Bhowmik and G. S. Bajwa. Indian. J. Phys. 34, 561-4(1951) Dec.

The paper deals with the asymmetry of cosmic rays at Delhi ($\lambda = 19°$, height 700 feet). East-west asymmetry of the hard component of cosmic rays has been measured with two telescopes of angular resolution 10° in the vertical plane and 38° in the complementary plane. The soft component was filtered out by using 10 cm of lead. Errors due to fluctuation, and relative inefficiency of the counting system were minimized by frequently exchanging the position of the telescopes with a special arrangement. The asymmetry rises to a maximum of 13% at zenith angle 40° and falls off at higher angles. (auth)

3601
THE STRUCTURE OF EXTENSIVE SHOWERS. I. D. Campbell and J. R. Prescott. Proc. Phys. Soc. (London) A65, 258-68(1952) Apr. 1.

The form of the structure function of extensive showers at small distances from the core has been investigated by observations of coincidences between ionization chambers at sea level. The observations considered are the decoherence curve and the burst-ratio distribution. Both sets of results indicate a structure function that varies as $1/r^{0.8}$ for small r (less than 0.04 lateral shower units at sea level) as opposed to the well-known Moliere function which behaves as 1/r for small r. A modified structure function is given in tabular form. The advantages of the burst-ratio distribution method of studying the structure function are discussed. (auth)

3602
THE DOUBLE STAR EFFECT IN NUCLEAR EMULSION PLATES EXPOSED TO THE COSMIC RAYS. G. Davis. Phil. Mag. (7) 43, 472-3(1952) Apr.

Emulsion plates exposed to cosmic radiation were reexamined, and an excess of close star pairs reported by a previous investigation was found to be incorrect and probably due to inexperienced searching. The so-called Li effect thus seemed to be disproved.

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

3603
Knolls Atomic Power Lab.
ON PLASTIC FLOW IN ALKALI HALIDE CRYSTALS, by W. W. Tyler. [nd] 4p. (AECU-2011)

Studies are reported to determine whether enhanced conductivity observed in alkali halides subsequent to plastic deformation may be at least partially electronic in origin as proposed by Z. Gyulai and J. Boros in Math. nautrw. Anz. ungar. Akad. Wiss., 59, 115(1940). Single crystals of KCl and KBr were used in the studies. Stresses of only about 10^7 dynes/cm^2 produced detectable current changes. Half times for decay of the enhanced conductivity were observed to be about 0.2 sec with no appreciable fraction of the induced current changes persisting for greater than several seconds. Both the short duration of current changes and the sensitivity to coloration suggest that the increased conductivity observed by Gyulai and Boros may be due to electrons liberated in the vicinity of slip planes during plastic flow.

3604

STABILIZATION OF ZIRCONIA WITH CALCIA AND MAGNESIA. Pol Duwez, Francis Odell, and Frank H. Brown, Jr. J. Am. Ceram. Soc. 35, 107-13(1952) May 1.

An abstract of this paper appears in Nuclear Science Abstracts as NSA 5-3684.

3605

THE CRYSTAL PARAMETERS OF BERYLLIUM. E. A. Owen. Proc. Phys. Soc. (London) A65, 294-5(1952) Apr. 1.

A summary is given of the crystal parameters of Be obtained by several workers. The values of different parameters obtained for various purities and temperatures are discussed.

ELECTRONS

3606

ELECTRON-ELECTRON INTERACTION IN HEAVY ATOMS. G. E. Brown. Phil. Mag. (7) 43, 476-71(1952) Apr.

The derivation from quantum electrodynamics of a Hamiltonian describing the interaction of two fast-moving electrons in a heavy atom to order $\alpha = e^2/_4\pi\hbar c$ is reported. The case considered is exemplified by the interaction of two K electrons in a heavy element, where v/c is of order 2α.

3607

SOME MAGNETIC PROPERTIES OF METALS. I. GENERAL INTRODUCTION, AND PROPERTIES OF LARGE SYSTEMS OF ELECTRONS. II. THE INFLUENCE OF COLLISIONS ON THE MAGNETIC BEHAVIOUR OF LARGE SYSTEMS. R. B. Dingle. Proc. Roy. Soc. (London) A211, 500-25(1952) Mar. 20.

A general introduction surveying the problems to be examined in a series of papers is followed by a detailed treatment of the magnetic behaviour of a large system of electrons. The Schroedinger equation is solved on the assumption that the system is unbounded, and the modifications caused by the finite size of the system are then determined for the limiting case in which the system is much larger than the electronic orbits. An expression is then obtained for the density of states, and the free energy of the system found assuming that $kT < E_0$, where E_0 is the degeneracy parameter. The magnetic susceptibility, thermodynamic potential and specific heat are discussed for the two cases N constant and E_0 constant. Explicit formulas are given for the temperature-dependence of the field-independent term in the susceptibility. Corrections due to electron spin are introduced.

A discussion of the effect of collisions on the magnetic properties of a large system of free electrons shows that the non-periodic term in the susceptibility is hardly affected, but that the periodic terms are reduced in magnitude by a factor $\exp(-hp/\tau\beta H)$, where p is the harmonic considered, τ is the mean collision time, and $\beta = eh/2\pi mc$. (auth)

3608

RANGE-ENERGY RELATIONS FOR ELECTRONS AND THE DETERMINATION OF BETA-RAY END-POINT ENERGIES BY ABSORPTION. L. Katz and A. S. Penfold. Revs. Modern Phys. 24, 28-44(1952) Jan.

It is shown that for aluminum absorbers, a single range-energy equation $R = 412\ E_0^{1.265-0.0954 \ln E_0}$ (mg/cm^2) will fit the most reliable published values of practical ranges of monoenergetic electrons and the maximum ranges of nuclear beta-rays in the energy region $0.01 \leq E_0 \leq 2.5$ Mev. The average deviation of 59 monoenergetic measurements from this equation is +0.08 percent in energy, and −0.05 percent in energy for 35 beta-ray measurements. The mean deviation is 4.1 percent in each case. There are few ranges for energies above 2.5 Mev. All the higher energy values found in the literature and four new measurements on monoenergetic electrons are presented and are shown to be consistent with the range-energy equation $R = 530\ E_0 - 106$ (mg/cm^2) for $E_0 \geq 2.5$ Mev. It is shown that the curve (dE_0/dR) is nearly parallel to the theoretical curve for the rate of energy loss by ionization in the region between 0.01 and 20 Mev and is about 25 percent larger. The reason for this discrepancy is not known. All the methods commonly used to determine the ranges of beta-rays from absorption curves are discussed and a new method developed by the authors is presented. (auth)

GASES

3609

Los Alamos Scientific Lab.

TABLES OF THE LENNARD-JONES AND DEVONSHIRE EQUATION OF STATE AT HIGH TEMPERATURE AND DENSITIES, by W. Fickett and William W. Wood. [nd] 22p. (AECU-1987; LADC-1145)

The Lennard-Jones and Devonshire equation of state is computed for the following ranges of the reduced variables: Temperature, 20 to 150 in steps of 10; volume, 0.3 to 0.7 in steps of 0.05 and 0.7 to 1.3 in steps of 0.1. (auth)

3610

Los Alamos Scientific Lab.

THE LIQUEFACTION AND STORAGE OF PARTIALLY CONVERTED LIQUID HYDROGEN, by E. R. Grilly. [nd] 12p. (AECU-1977; LADC-1136)

Observations on the normal storage of liquid hydrogen showed the evaporation rate and ortho-para conversion rate to be consistent with those expected from a noncatalyzed reaction. A catalytic converter which gives 50% ortho when cooled with liquid air was installed in the feed-gas line of a 25 liter/hr hydrogen-liquefaction plant. The decrease in storage loss is well worth the trouble of installation and operation of the converter. (auth)

3611

THE MATHEMATICAL THEORY OF ELECTRICAL DISCHARGES IN GASES. Taro Kihara. Revs. Modern Phys. 24, 45-61(1952) Jan.

The fundamental processes of the molecular kinetic theory of electrical discharges concern the collisions between gas molecules and charged particles such as ions or electrons. The effective cross sections of the molecule for elastic, exciting, and ionizing collisions are the fundamental quantities regarding these phenomena. Two methods are considered, according to how these fundamental quantities are introduced, to establish the molecular kinetic theory. One method is to adopt a proper molecular model for collision processes. The other method is to adopt the "exact" (i.e., observed or quantum-mechanically calculated) values of collision cross sections. This paper concerns itself with the first method, and the principal objective is to attain mathematical simplicity for the theory. The second method is abandoned because the statistical calculation on each step is complicated, and furthermore, the calculation must be achieved separately for each kind of gas. This second method may be adequately adopted after the treatment based on a model is accomplished. (auth)

3612

DIFFUSION AND FLOW OF GASES AND VAPOURS THROUGH MICROPORES. IV. FLOW OF CAPILLARY CONDENSATE. P. C. Carman. Proc. Roy. Soc. (London) A211, 526-35(1952) Mar. 20.

If capillary condensation occurs in a porous plug and a steady pressure difference of an adsorbed gas is maintained across the plug, capillary condensate behaves as if it were bulk liquid in viscous flow through the pore-space. The driving force producing flow is not the pressure difference of the gas, but a very much larger difference of capillary pressure resulting from this pressure difference, presumably due to action of surface tension at curved menisci in the pores. The mechanism contrasts sharply with flow in adsorbed films, which has earlier been shown to conform to a process of surface diffusion. In a saturated plug, observed permeabilities agree very well with calculated values, assuming capillary condensate has the viscosity and density of bulk liquid. Apart from confirming the mechanism of flow, this suggests that liquid properties are not much altered in capillaries of radii down to at least 20 A. At a given mean pressure of gaseous adsorbate, the permeability has a very different value if the pressure is approached by desorption from a saturated plug from that when the pressure is approached by adsorption from a degassed plug. This is because, due to adsorption hysteresis, the saturation of the plug is different in the two experiments. For a given degree of saturation, the permeability is the same in both adsorption and desorption runs. (auth)

INSTRUMENTS

3613

Atomic Energy Research Establishment, Harwell, Berks (England)

THE EXAMINATION OF METALS UNDER POLARISED LIGHT; PART V. FURTHER WORK ON THE EFFECT OF STRAIN IN OBJECTIVE LENSES, by B. W. Mott, H. R. Haines, and J. Woodrow. Feb. 4, 1952. 18p. (AERE M/R-856)

Further work is described on the effect of strain in objective lenses used for the examination of metals under polarized light, and a procedure is described for overcoming the resulting anomalies. A method is given for comparing the degree of strain in various objectives, and a comparison is made between the performances of both a reflecting and several transmission objectives. It is concluded that by correct adjustment of the objective, intensity/azimuth angle curves which are in agreement with theory, can be obtained on both single and multigrained specimens. (auth)

3614

Stamford Research Labs., American Cyanamid Co.

AN INFRARED GAS ANALYZER FOR MEASURING THE CONCENTRATION OF FLUOROCARBON VAPORS IN AIR, by Van Zandt Williams and Robert S. McDonald. [nd] Decl. May 5, 1952. 15p. (AECD-3371; A-3958)

An infrared gas analyzer has been built for determining the amount of fluorocarbon vapor in air in the range 10 to 1000 ppm by volume. The LiF shutters limit the radiation through the sample and reference cells to the wavelengths between 7 and 11μ. The detector consists of two chambers filled with fluorocarbon to absorb radiation corresponding to the C-F stretching vibrations. Pressure changes in the cells are equalized by an oil-drop manometer. The analyzer will detect about 5 ppm of C_8F_{16} vapor in air and will measure concentrations greater than 100 ppm with an accuracy of ±5%. Photographs of the completed apparatus are included.

3615

Oak Ridge National Lab.

AN AUTOMATIC MULTIRANGE RECORDING DEVICE FOR MEASURING VARYING POTENTIALS, by J. C. Pigg. Issued May 8, 1952. 32p. (ORNL-1199)

In measurements of the changing electrical properties of semiconductors during neutron bombardment in the nuclear reactor, it is desirable to use automatic recording methods whenever possible. A device has been constructed and is currently being used which fulfills the requirements of the semiconductors under consideration. The components are a 0- to 3-mv 12-point Brown Electronik recorder with a 4-pole 12-position circuit-selector switch ganged to the Brown input-selector switch; a system of limit switches which activate appropriate stepping relays for automatic circuit changes; a system of scale indication; a Vibrating Reed Electrometer for high-resistance measurements; and constant-current, constant-voltage, and variable-power supplies. By means of the limit switches and relays, proper scale and circuit changes can be made to keep the data within the range of the recorder and provide a linear plot for changes up to 12 orders of magnitude. This instrument is currently being used to measure the resistivity of germanium, silicon, and cuprous oxide during neutron bombardment and can also be used to measure static characteristics of semiconductor circuit components. (auth)

3616

AN ELECTRONIC MAGNET CURRENT STABILIZER. J. Schutten. Applied Sci. Research (Netherlands) B2, 249-63(1952)

An electronic magnet-current stabilizer has been developed, capable of keeping constant the magnet current of an isotope separator to 1 : 20,000. Easy adjustment of current is obtained by setting a four-step decade resistor. By using a contact-modulated d-c amplifier instead of applying the usual galvanometer-phototube-amplifier method, the apparatus is made insensitive to overloading and vibrations. (auth)

ISOTOPES

3617

THE ISOTOPE EFFECT IN SUPERCONDUCTIVITY. II. TIN AND LEAD. B. Serin, C. A. Reynolds, and C. Lohman. Phys. Rev. 86, 162-4(1952) Apr. 15.

The critical magnetic fields, H, of various isotopic mixtures of tin and of lead have been measured as a function of temperature, T. For tin, the critical temperature T_c at zero field is related to the average mass number M by the relation $M^{0.46}T_c$ = const. The critical magnetic fields H_0 at absolute zero are proportional to the critical temperatures. The normalized values of critical field H/H_0 are the same function of the variable T/T_c for all the isotopes. An analytic expression for this function giving the best fit to the experimental data is given. The measurements on lead were made in the temperature range 1.6 to 4.2°K. The data clearly indicate that the isotope effect is present in this superconductor. (auth)

3618

A RADIOACTIVE ISOMER OF ^{166}Ho. F. D. S. Butement. Proc. Phys. Soc. (London) A65, 254-8(1952) Apr. 1.

Irradiation of holmium with pile neutrons produces, in addition to 27-hr Ho^{166}, a new long-lived holmium isotope with a half life greater than 30 yr. It is shown that it cannot be Ho^{167} produced by neutron capture in Ho^{166}, nor Ho^{164} produced by a (n,2n) reaction. It is therefore probably an isomer of the 27-hr Ho^{166}. It decays with emission of β-particle groups of energies 0.18, 0.28 and 1.1 Mev, γ rays of energies 0.830, 0.725, 0.280, 0.212 and (weak) 0.095 Mev, and weak erbium K x rays. β-γ and γ-γ coincidence measurements have been made and a decay scheme suggested. (auth)

MASS SPECTROGRAPHY

3619

Vanderbilt Univ.

THE VANDERBILT BETA-RAY SPECTROMETER AND THE RADIOACTIVE DECAY OF TIN 113 (thesis), by Dan A. Thomas. [nd] 77p. (ORO-64)

A β-ray spectrometer using two thin magnetic electron lenses has been constructed. The spectrometer is designed to permit the study of electron spectra involving both low and relatively high energies in the same spectrum and to permit the use of the large-area radioactive sources necessary for weak activities. The thinnest Geiger counter tube window made and used permitted the passage of some 3-kev electrons and almost all 20-kev electrons. The window was made of Nylon backed with a Lectromesh grid, and was 18 μg/cm thick. The spectrometer is designed to use field currents from 0.2 to 25 amp. A study was made with the spectrometer of the radioactive decay of Sn^{113} and a new method is described for the determination of disintegration energies for certain orbital capture isotopes.

3620

Biophysical Lab., Harvard Medical School

EMISSION REGULATOR FOR MASS SPECTROMETER, by A. K. Solomon and David C. Caton. [nd] 5p. (AECU-2014)

An emission regulator based on the use of an a-c amplifier rather than the conventional d-c amplifier and saturable core reactor circuit has been designed for use in a 60° Nier mass spectrometer. The trap current, which is a measure of the electrons effective in forming the ion beam, is the element from which the regulating signal is drawn. The filament is energized by a 1080-cycle voltage which makes it possible to use a commercial audio transformer in the output stage and permits the use of smaller components to make a relatively compact unit. The regulator is quite stable in operation, and there is virtually no drift after 15-min warm-up. Performance characteristics and a circuit diagram are presented.

3621

THE INFLUENCE OF FRACTIONIZING AND VISCOSITY EFFECTS IN MASS SPECTROMETRIC GAS HANDLING SYSTEMS. J. Kistemaker. Physica 28, 163-76(1952) Mar.

The fractionizing and viscosity effects in a viscous leak were investigated using the relations governing the flow of gas in the intermediate pressure region. The gas fractionizing in the wide tube, at the beginning of the constriction, reached the stationary state under certain conditions after only several hours. This can cause rather big drift effects in the ratios of the gas components observed. The practical limitations to high precision mass spectrometry, as far as the fractionizing in the gas sample itself changes the original composition, was considered. To reach an accuracy of 0.01% it is always advisable to take the container not smaller than 100 cm^3. If, also, the pressure is kept sufficiently equal in various samples, isotope ratio determinations in O^{16}, O^{17}, and O^{18} of 0.01% seem to be possible.

MATHEMATICS

3622

Nuclear Development Associates, Inc.

ASYMPTOTIC SOLUTIONS OF VOLTERRA INTEGRAL EQUATIONS, by J. Ernest Wilkins, Jr. Feb. 25, 1952. 11p. (NYO-3072)

A theorem necessary in the asymptotic solution of the straight ahead transport equation with constant total mean free path is proven. (cf. NYO-639; NSA 6-384)

3623

Knolls Atomic Power Lab.

COMBINING ERRORS INVOLVING A CALIBRATION CURVE, by W. S. Horton. Apr. 14, 1952. 15p. (KAPL-725)

Elementary statistical theory has been applied to the case of an analytical result reported as the mean from n determinations on an unknown involving a calibration curve prepared from m standards. The linear, semilog, and log-log calibration curves are considered. It is shown that the confidence limits, L_c, for the average result are given by:

$$L_c = \pm t_m S \sqrt{\frac{1}{m}(1 + d_x^2/\sigma_x^2) + \frac{1}{n}},$$

where t_m is Student's t for m - 2 degrees of freedom, S is the standard error of estimate for the calibration curve, d_x is the distance of the average measured variable from the mean of those encountered in the calibration, and σ_x^2 is $\Sigma\ (d_x^2/m)$ for the calibration points. This result is derived for the linear case assuming that the errors follow the normal law, that there are no constant errors, and that the unknown sample is drawn from the same universe as the calibrations. The semi-log and log-log curves permit transformation to the linear case; therefore, the same treatment applies in slightly modified form. When the unknown is from a universe of different standard deviation, a modification of the basic formula is possible. (auth)

3624

DIVERGENCE DIFFICULTIES FOR A PARTICULAR MODEL OF THE QUANTIZED FIELD. Leon Van Hove. Physica 28, 145-59(1952) Mar. (In French)

It is well known that for a neutral scalar field in scalar interaction with infinitely heavy, fixed point sources, the stationary states can be determined exactly. This simple case of quantized field is considered for the discussion of the following two problems: to investigate the origin of the divergence difficulties which are unavoidably brought in when the interaction is treated as a perturbation, and to see how good a description of the exact solution is obtained from the perturbation method as improved by the renormalization technique for discarding divergences. The origin of the divergences is found to lie in the fact that the stationary states of the field interacting with the sources are no linear combinations of the stationary states of the free field. The former are not contained in the Hilbert space spanned by the latter (they even turn out to be orthogonal to this space). As a consequence of results obtained in a previous paper, a similar property is shown to hold for the more realistic case of two interacting fields under the mere assumption that stationary states exist in presence of interaction. Regarding the second problem, whereas the exact solution and the results obtained by perturbation and renormalization methods are in agreement for the S matrix, they are found to disagree for the unitary matrix S(t) expressing the change of the wave vector between times $t = -\infty$ and t finite. (auth)

3625

GENTILE'S INTERMEDIATE STATISTICS. D ter Haar. Physica 28, 199-200(1952) Mar.

An intermediate statistics proposed by Gentile in 1940 suggests that the maximum number of particles in a non-degenerate energy level is not 1 or ∞ but equal to a finite number d. The present paper derives an expression for $W(N_i)$, the probability of a distribution of energy levels where the number of particles in the i-th level is N_i, and it is shown that the expression is the same as the expression for $W(N_i)$ in the case of Bose-Einstein statistics.

MEASURING INSTRUMENTS AND TECHNIQUES

3626

Ohio State Univ.

COINCIDENCE METHOD APPLIES TO ION BEAM MEASUREMENT, by Stanley Fultz and M. L. Pool. Feb. 1952. 13p. (NACA-TN-2627)

A coincidence Geiger counter system was constructed for the absolute measurement of the activity of radioactive substances made in a cyclotron. The average beam current in the cyclotron can be calculated from the number of disintegrations per second observed, the half life of the radioactive substance, and the reaction cross section. (auth)

3627

National Bureau of Standards

FINAL REPORT ON MODEL 1; GAMMA SURVEY INSTRUMENT. April 25, 1951. 20p. (NP-3730)

An instrument is being designed to quantitatively survey disaster-areas for extent and level of radioactivity up to 100 r/hr. Requirements include an accuracy of ±20%, a self-contained power supply, a 50-hr life between battery replacements, simplified circuitry, and economy. Methods of eliminating the sensitive and expensive microammeter were studied. Direct methods employing cold-cathode glow, thermal-indicating, and color-indicating devices which converted 0- to 50-μa currents into a visual range were rejected. An indirect-indicating γ-survey instrument based on a potentiometric comparison of voltages gave accurate values with simple manipulation. Aural indicators for detecting low and null (down to 5 μa) levels were constructed using (1) chopper contacts and (2) a thyratron acting as a relaxation oscillator. A circuit incorporating an RK61 thyratron was developed. A housing was devised based on a flashlight design for economy and convenience in handling and battery replacement. (NRS abst.)

3628

Atomic Energy Project, Univ. of Calif., Los Angeles

NOTE ON A METHOD FOR THE SPEEDING UP AND IMPROVING THE CONTRAST OF THYROID SCINTIGRAMS, by Lawrence Curtis and Benedict Cassen. Issued Apr. 25, 1952. 8p. (UCLA-196)

A method is described for speeding up and enhancing the contrast of thyroid scintigrams which depends on operating relays from a rate-meter circuit. If the rate is below a present threshold the scanning motor goes faster and the recording printer is non-operative. The enhancement of contrast by not recording the background is very striking. (auth)

3629

Radiation Lab., Univ. of Calif.

DESCRIPTION OF A DROPPING MERCURY POLAROSCOPE. [nd] 24p. Decl. May 5, 1952. (AECD-3369; RL-4.6.261)

The construction and operation of a dropping mercury polaroscope developed by Quentin A. Kerns is described. With this polaroscope a Heyrovsky polarogram is automatically produced on the screen of a cathode ray tube during the formation of each drop at the tip of a dropping mercury electrode. As each drop falls, a change in the resistance of the cell operates to initiate the generation of a voltage wave to be applied to the cell during the formation of the next drop during a predetermined fractional portion of the average drop formation period. (auth)

3630

Argonne National Lab.

A VACUUM LOCK FOR ROUTINE SOLID ANALYSES WITH A MASS SPECTROMETER, by Charles M. Stevens. Dec. 1951. 19p. (AECU-1996; UAC-535)

A vacuum lock for rapid introduction of solid samples into a mass spectrometer is described. Analyses of the highest resolution requiring high vacuum can be made in five to ten minutes following the introduction of the sample. With an analysis time of about one hour using a surface-ionization type of source, six to eight samples can be run in an eight-hour day. The unit is incorporated in a 12-in. 60° mass spectrometer. (auth)

3631

Oak Ridge National Lab.

AN EXPERIMENTAL STUDY OF THE PERFORMANCE OF A CAVITY TYPE IONIZATION CHAMBER, by G. H. Jenks, W. M. Breazeale, and J. J. Hairston. [nd] Decl. with deletions Apr. 28, 1952. 8p. (AECD-3358)

Comparisons between calorimetric and ionization chamber measurements of the power generated in graphite by absorption of energetic gamma rays have been carried out. The results serve as a calibration of the chamber. They also serve to test the consistency between the theoretical performance of this type of chamber and previously determined values for the factors which relate ionization in the chamber to energy absorption in the walls. (auth)

3632

AN ELECTROMETER PEN, A POCKET DOSIMETER. J. Weill, A. Rogozinski, G. Rastoix, and P. Janot. J. radiol. électrol. 33, 43-5(1952). (In French)

A fountain-pen-shaped dosimeter, consisting of a quartz-wire ionization chamber and a 60 × microscope, is described. Its similarly shaped charger includes a 200-v Zamboni-type pile.

3633

LUMINESCENCE OF KCl(Ni) AND KCl(Cu) PHOSPHORS EXCITED BY X RAYS. I. A. Parfianovich. Zhur. Eksptl'. i Teoret. Fiz. 21, 1389-95(1951) Dec. (In Russian)

The effects of excitation temperature on the luminescence spectra of KCl(Ni) and KCl(Cu) phosphors are described, and the nature of the energy levels and F centers in these crystals and in NaCl(Ni) and NaCl(Cu) is discussed.

3634

X-RAY LUMINESCENCE OF ZINC SULFIDE LUMINOPHORS. A. I. Rusanova. Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 15, 754-61(1951) Nov.-Dec. (In Russian)

Luminescence spectra at 950 to 1150°C of ZnS phosphors activated with Zn, Ag, Mn, Cu, or Fe and excited by x rays or ultraviolet light are presented and discussed.

3635

A SIMPLE COMBINED ELECTROMETER CHARGER FOR RADIATION PROTECTION POCKET IONISATION CHAMBERS. A. H. Wapstra. Applied Sci. Research (Netherlands) B2, 269-72(1952)

A rugged vacuum tube electrometer for the measurement of the voltage loss of pocket ionization chambers is described; all supply voltages, filament included, are stabilized with neon filled tubes 85A1. The same instrument can be used as a charger. (auth)

3636

AN EASILY DEGASSABLE IONIZATION GAUGE WITH A SIMPLE AND STABLE CIRCUIT. N. Warmoltz and E. Bouwmeester. Applied Sci. Research (Netherlands), B2, 273-6(1952)

An ionization gage of the tetrode type is described, with two grids and a thin ion collector on the glass wall, which is degassable by heating it in an oven and passing current through the grids. The electron current is stabilized by the first grid. For measuring the ion current a balanced bridge d-c amplifier with one tube is used. (auth)

3637

ON THE WAVE-LENGTH DEPENDENCE OF SCINTILLATION COUNTERS IN THE X-RAY REGION. G. Breitling and R. Glocker. Naturwissenschaften 39, 84(1952) Feb. (In German)

The function i/D, where i is the current in a photomultiplier tube measuring the fluorescence of a scintillator and D is the current in an air ionization chamber exposed to the exciting x radiation, is plotted as a function of x-ray wave length for an anthracene single crystal and for terphenyl in chlorobenzol, benzol, and 0.2 chlorobenzol + 0.8 benzol. The latter has a constant response within 3% from 0.08 to 0.6 kX. It would be suitable for use in a dose meter measuring x radiation directly in r units.

3638

PREPARATION OF NUCLEAR-TRACK PLATES AND STRIPPING FILMS FOR THE STUDY OF RADIOACTIVE MINERALS. L. R. Stieff and T. W. Stern. Am. Mineral. 37, 184-96(1952) Mar.-Apr.

Some modifications of current techniques for preparing nuclear plates for mineralogical studies are described. A method of mounting nuclear-track stripping film on thin sections is given. Illustrations are presented of the application of these techniques to the study of the radioactivity of powdered rocks, minerals, and thin sections. (auth)

3639

FILM DOSIMETRY OF ELECTRONS IN THE ENERGY RANGE 0.5 TO 1.4 MILLION ELECTRON VOLTS. J. Fleeman and F. S. Frantz, Jr. J. Research Natl. Bur. Standards 48, 117-20(1952) Feb.

Two types of films were exposed to electrons in the energy range 0.5 to 1.4 Mev. The film response was found to be linearly proportional to the dosage received and independent of the energy of the incident electrons in the measured energy range. The photographic density is further shown to be dependent on the amount of paper absorber surrounding the film. A step-wedge filter is suggested that would permit extrapolation of densities to zero filter thickness. (auth)

3640

SLIT IONIZATION CHAMBER FOR MEASURING γ RAYS. I. V. Estulin. Zhur. Eksptl'. i Teoret. Fiz. 21, 1412-15 (1951) Dec. (In Russian)

A slit-type γ-ray ionization chamber with 400-cm^3 volume and C, Al, Fe, Cu, Sn, or Pb walls is described. In this type of chamber the wall separation is much smaller than the range of the photoelectron in the gas. The response is plotted as a function of atomic number of the wall material.

3641

DETERMINATION OF SPECIFIC ACTIVITIES OF C^{14}-LABELED ORGANIC COMPOUNDS WITH A WATER-SOLUBLE LIQUID SCINTILLATOR. Earle C. Farmer and Irving A. Berstein. Science 115, 460-1(1952) Apr. 25.

Measurements obtained with a liquid scintillator suitable for both organic and water-soluble materials and an experimental arrangement that permits a high counting efficiency are described. The solutions tested were placed in sample bottles in contact with the photocathode window of an EMI type 5311 photomultiplier tube. Both solution cell and photomultiplier tube were enclosed in a light-tight container. The output pulses from the EMI tube were fed into a linear amplifier with resolving time of 0.25 μsec and then into a scaler circuit, all at room temperature.

3642

MEASUREMENT OF CESIUM-137 AND COBALT-60 GAMMA RADIATION WITH A PRESSURE IONIZATION CHAMBER. G. R. Grove. J. Research Natl. Bur. Standards 48, 147-51 (1952) Feb.

The characteristics of the pressure ionization chamber at the National Bureau of Standards have been studied for the gamma radiation from a Ce^{137} source (0.6614 Mev) and from a Co^{60} source (1.1715 and 1.3316 Mev). The dosage rates produced in air by these sources were measured with this chamber with an accuracy of about 2%. Dosage rates obtained with an extrapolation chamber and a Victoreen thimble chamber agreed with the values measured by the pressure chamber within the limits of the experimental errors. (auth)

3643

A THICK-WALLED IONIZATION CHAMBER FOR MEASURING THE INTENSITY OF X-RADIATION OF ENERGY UP TO 25 MEV. B. H. Flowers, J. D. Lawson, and E. B. Fossey. Proc. Phys. Soc. (London) B65, 286-95 (1952) Apr. 1.

A thick-walled ionization chamber suitable for measuring the radiation intensity from synchrotrons and betatrons operating at energies up to 25 Mev is described. Calibration curves giving the current in the chamber per incident photon as a function of photon energy are given. The effect of wall thickness and secondary x rays produced in the wall have been considered and included in the calculations. Experimental results consistent with the theory are described. (auth)

3644

GROSS MEASUREMENT OF THE FIXATION OF RADIOIODINE BY THE THYROID. M. Moret. J. radiol. électrol. 33, 66-8(1952). (In French)

Total I^{131} fixation by the thyroid can be measured directly by the apparatus described. It consists of a γ-ray counter at the apex of a cone-shaped Pb screen, the open end of which is shaped to conform to the patient's neck.

3645

CONDUCTIVITY CRYSTAL COUNTERS. A. G. Chynoweth. Am. J. Phys. 20, 218-26(1952) Apr.

This is a brief review article on conductivity crystal counters in which their main properties and basic principles of operation are described. Their present position in the field of nuclear instrumentation is discussed, it being concluded that there are still many serious problems to be solved before the counters can be of practical use. Some of these problems and the present methods of tackling them are surveyed. (auth)

3646

LIBERATION OF SECONDARY ELECTRONS BY POLYATOMIC IONS AND AGING PHENOMENA IN SELF-QUENCHING GEIGER-MUELLER COUNTERS. Enrica Beretta and Annamaria Bianchi. Atti accad. nazl. Lincei, Classe sci. fis. mat. e nat. (8) 11, 353-6(1951) Dec. (In Italian)

Coefficients of electron emission of methane, ethyl ether, methylal, methyl, ethyl, propyl, and isopropyl alcohols, and methyl, ethyl, and isopropyl acetates; distribution curves for the intervals between two successive impulses in G-M counters filled with these compounds at 10 mm Hg and A at 90 mm Hg; and curves showing the effect of aging, i.e., operation, on this distribution are presented.

3647

MEASUREMENT OF NEUTRON FLUX WITH LITHIUM BORATE LOADED EMULSIONS. Nathan Kaplan and Herman Yagoda. Rev. Sci. Instruments 23, 155-65(1952) Apr.

Methods for the incorporation of lithium borate in non-electron-sensitive nuclear emulsions have been investigated from the viewpoint of emulsion stability and high B^{10} and Li^6 pick-up for use in the estimation of low neutron flux. Ilford C-2 plates loaded by absorption from 10 percent lithium borate solution buffered with lithium carbonate and containing 3 percent by volume of glycerine or diethylene glycol pick-up an equilibrium concentration of 34 mg per cc of boron and 12 mg per cc of lithium ions, respectively. Isothermal absorption curves indicate that the borate and lithium ions migrate into the gelatin–AgBr mixture at different rates. Higher concentrations of B and Li nuclei in the emulsion can be introduced by the method of evaporation loading. Methods for evaluating the boron and lithium concentration in the emulsion are described. Quantitative recording of tracks from the B^{10}(n,α)Li^7 and the Li^6(n,α)H^3 reactions can be maintained for periods of about 3 months; which provides a convenient means of estimating low slow-neutron flux for purposes of health monitoring, or investigations of spontaneous fission processes, and for the evaluation of the cosmic-radiation neutron background. The flux at sea level arising from cosmic radiation is of the order of 230 slow neutrons per cm^2 per day, (ranging from 160 to 300 with change of exposure conditions). At an elevation of 3500 m, the flux shows a 10-fold increase. (auth)

MESONS

3648

Radiation Lab., Univ. of Calif.
SUMMARY OF THE RESEARCH PROGRESS MEETING OF AUGUST 2, 1951, by Bonnie E. Cushman. Oct. 25, 1951. 5p. (UCRL-1526)

Scattering by Hydrogen, by J. Lepore. Data on π^--scattering by H obtained by Fermi at the Chicago cyclotron have been analyzed. The experimental arrangement used for measuring absorption and scattering cross sections is shown. The graph of total cross section vs. meson energy shows an extremely rapid rise, linear within the limits of experimental error. The analysis of the data postulates an interaction between the proton and meson which is very sensitive to the meson energy. The sharp rise in the cross section suggests that there may be some sort of resonance involved due to the formation of a metastable nucleon isobar. If this idea is adopted one can fit the shape of Fermi's curve if the resonance energy is chosen to be $E_0 \sim 250$ Mev. Spin of the π^+ Meson, by K. Watson. Evidence concerning the spin of the π^+ meson is very briefly summarized. The experimental arrangement used by Durbin, Loar, and Steinberger at Columbia to measure the cross section for the $\pi^+ + d \to p + p$ reaction is sketched, and cross-section curves are shown. The evidence points to a spin of zero for the π^+ meson.

3649

THE PRODUCTION OF POSITIVE MESONS BY PHOTONS. J. Steinberger and A. S. Bishop. Phys. Rev. 86, 171-9 (1952) Apr. 15.

Experimental results are presented on the production of positive mesons in hydrogen and carbon, as a function of meson angle and energy. The principal results are as follows: The angular distribution in the case of hydrogen is rather flat in the region 45 to 135° in the laboratory system, slightly peaked near 90°. This demonstrates that the pion is not a scalar. The excitation function at 90° rises approximately linearly to a plateau which starts at photon energies of about 260 Mev. This rise is slower than expected on the basis of a phase space argument. The total cross section for 255-Mev photons in hydrogen is $1.9 \pm 0.3 \times 10^{-28}$ cm^2. The cross sections in carbon are lower, per proton, by a factor of approximately three. With respect to hydrogen, the meson energy distribution is shifted to lower energies and the angular distribution is shifted to the backward angles. (auth)

3650

SCATTERING OF π MESONS BY PROTONS AND DEUTERONS. V. B. Berestetskiĭ and I. M. Shmushkevich. Zhur. Eksptl'. i Teoret. Fiz. 21, 1321-9(1951) Dec. (In Russian)

Expressions are derived for the scattering of π mesons by protons and deuterons for pseudovector and pseudoscalar couplings. Pseudoscalar coupling leads to too large cross sections, indicating contradiction with theory in this case.

3651

PHOTO-MESON PRODUCTION FROM DEUTERONS. Shigeru Machida and Taro Tamura. Progress Theoret. Phys. (Japan) 6, 572-80(1951) July-Aug.

Photo-meson production from deuterons is treated phenomenologically, using the impulse approximation. It is found that the distortion of the nuclear wave function is essential and that its effect is taken into account adequately by shape-independent approximation. Production of negative mesons is diminished by the effects of coulomb interaction between two protons in the final state. (auth)

3652

ON THE METHOD OF THE THEORY OF NUCLEAR FORCES. Mituo Taketani, Seitaro Nakamura, and Mumeo Sasaki. Progress Theoret. Phys. (Japan) 6, 581-5(1951) July-Aug.

From the standpoint of the meson theory of nuclear force, results of current analysis on phenomenological nuclear potentials are reexamined. A new method of the theory of nuclear forces is proposed. Meson potentials for the outside region and phenomenological parameters for the inside region of the nuclear forces are employed. (auth)

3653

SOME ASPECTS OF THE DECAY OF MESONS AND THE NEUTRINO THEORY OF LIGHT. Christoffel Benjamin Van Wyk. Ph.D. Thesis, Cambridge Univ., 1950.

The first part of the dissertation is concerned with meson decay. Standard perturbation theory is applied to decay processes which are supposed to occur by means of the creation and annihilation of nucleons. The second part of the dissertation gives reasons why the neutrino theory of light is inconsistent if neutrinos are described by charge self-conjugate wave functions.

3654

PRODUCTION OF π MESONS BY γ RAYS ON DEUTERONS. B. L. Ioffe and I. M. Shmushkevich. Doklady Akad. Nauk S.S.S.R. 82, 869-72(1952) Feb. 21. (In Russian)

Equations for the differential cross sections for photoproduction of π^+, π^-, and π^0 mesons on deuterium are derived. The cross sections are then expressed as functions of analogous expressions for the proton and neutron.

3655

GENERATION OF PARTICLES BY COLLISION OF FAST NUCLEONS. E. L. Feĭnberg and D. S. Chernavskiĭ. Doklady Akad. Nauk S.S.S.R. 81, 795-8(1951). Dec. 11. (In Russian)

Fermi's theory (Progress Theoret. Phys. 5, 570(1950)) of the interaction of high-energy nucleons to form π mesons in an ellipsoidal nuclear volume is criticized, particularly with regard to the shape of the interaction volume.

3656

ON THE INTERACTION OF MESONS AND PLURAL VS. MULTIPLE MESON PRODUCTION. Alexander W. Stern. Science 115, 352-3(1952) Mar. 28.

Recent work on the interaction and production of mesons is described briefly. The results of scattering experiments suggest that the anomalous scattering of π mesons of energies greater than about 60 Mev by complex nuclei may be a function of the density of the nucleons in a volume of the order involving the Compton wave length of the meson. Multiple meson production probably results in cosmic ray showers from nucleons acting as nucleus subunits or groups. The volumes of interaction which suggest the nonlocalizability of nucleonic interactions may be termed "elementary volumes" and may be identified as functions of the elementary lengths.

3657

CONVERSION OF A CHARGED π MESON INTO A NEUTRAL MESON IN COLLISIONS WITH PROTONS AND DEUTERONS. V. B. Berestetskiĭ and I. Ya. Pomeranchuk. Zhur. Eksptl'. i Teoret. Fiz. 21, 1313-20(1951) Dec. (In Russian)

Expressions for the variation with energy and type of interaction of the cross section for conversion of π^+ or π^- into π^0 mesons are derived. Theoretical expressions for angular distribution are compared with experimental data.

MOLECULAR PROPERTIES

3658

THE ACTIVATION ENERGY OF THE para-HYDROGEN CONVERSION ON TUNGSTEN. A. Couper and D. D. Eley. Proc. Roy. Soc. (London) A211, 544-63(1952) Mar. 20.

A study has been made of the activation energy, E, and frequency factor, B^0, for the conversion of para-hydrogen on tungsten. All experiments were made at around 1 mm pressure. The E and B^0 values are independent of variations in wire length, bath temperature and wall thickness, factors likely to change the temperature distribution along the wire. The values vary somewhat from one wire to an-other, and may be more markedly modified by exposure to hydrogen atoms or sodium vapor. The values of E and log B^0 fit a linear relation, the physical reality of which is supported by two facts: (a) a quite different slope is obtained if the tungsten wire is 'poisoned' with carbon monoxide and other gases, (b) a relation of a different kind is found for palladium-gold alloy wires. It is tentatively suggested that the slope of the relation E against log B^0 is determined by the resonance interaction in the adsorbed film, including the sites neighboring the one on which the activated complex is formed. (auth)

3659

THE REVERSIBLE DISSOCIATION OF HYDROGEN MOLECULES AND THE para-HYDROGEN CONVERSION. A. Couper and D. D. Eley. Proc. Roy. Soc. (London) A211, 536-43(1952) Mar. 20.

An examination has been made of the hypothesis that the rate of the para-hydrogen conversion on tungsten is determined by the rate of condensation of hydrogen molecules into an almost full monolayer of chemisorbed atoms. Using the Peierls equation, and employing parameters consistent with the adsorption isotherm and heat data (in particular an interatomic repulsion energy of $NV = 4800$ cal/mole), it is shown that the calculated values of absolute rate, activation energy, and pressure dependency are in disagreement with those observed experimentally. (auth)

NEUTRONS

3660

Los Alamos Scientific Lab.

TABLES OF FUNCTIONS ASSOCIATED WITH THE SERBER-WILSON METHOD FOR NEUTRON DIFFUSION CALCULATIONS IN A SPHERICAL GEOMETRY; VOLUME II, by Dura Sweeney, Max Goldstein and Bengt Carlson. May 1950. 81p. (LA-1365)

The functions $Q(y,\varphi)$, $S(y)$, $R(y,\varphi)$ and $T(y)$ are defined and tabulated for $y = 0.00(0.01)3.00$ and $\varphi = 0.0(0.1)0.5$ to $1.5(0.1)2.0$ and $1/\varphi = 0.5(0.1)0.0$. Tables of κ and φ for $f = -0.200(0.001)0.200$ and $-1.00(0.01)1.00$ are included.

3661

Los Alamos Scientific Lab.

TABLES OF FUNCTIONS ASSOCIATED WITH THE SERBER-WILSON METHOD FOR NEUTRON DIFFUSION CALCULATIONS IN A SPHERICAL GEOMETRY; VOLUME III, by Dura Sweeney, Max Goldstein and Bengt Carlson. Dec. 1950. 54p. (LA-1366)

It was found necessary to extend the tabulations of the functions $Q(y,\varphi)$, $S(y)$, $R(y,\varphi)$, and $T(y)$ defined and tabulated in Volume I for $y = 0.00(0.01)3.00$ and $\varphi = 0.00(0.05)1.45$, $\pi/2$. The functions tabulated here are for $y = 3.00(0.01)5.00$ and $\varphi = 0.0(0.1)1.4$, $\pi/2$. The tabulations of $Q(y,\varphi)$, $S(y,\varphi)$, $R(y,\varphi)$, and $T(y)$ defined and tabulated in Volume II for $y = 0.00(0.01)3.00$ and $\varphi = 0.0(0.1)2.0$ and $1/\varphi = 0.5(0.1)0.0$ were also extended for $y = 3.00(0.01)5.00$ and $\varphi = 0.0(0.1)1.00$, $1/\varphi = 1.0(0.2)0.0$. (auth)

3662

THE INELASTIC SCATTERING OF VERY SLOW NEUTRONS BY IRON. R. Latham and J. M. Cassels. Proc. Phys. Soc. (London) A65, 241-5(1952) Apr. 1.

The increase with temperature of the total cross section of iron for very slow neutrons has been measured with the help of a cyclotron and a neutron velocity selector. Part of this increase is caused by the inelastic scattering associated with lattice vibrations, but the observed rise in cross section is much greater than is predicted by the theory of this effect. It is suggested that a ferromagnetic scattering process may be responsible for the discrepancy. (auth)

3663

SCATTERING AND ABSORPTION OF SLOW NEUTRONS. James MacDonald Cassels. Ph.D. Thesis, Cambridge Univ., 1950.

Four separate contributions to the scattering of neutrons of thermal and sub-thermal energies by crystalline matter are shown, and preliminary calculations of the two not discussed elsewhere in the literature are presented. The theory is applied to calculate the scattering by iron at various temperatures and neutron wave lengths. Two lines of experiment are suggested: (1) the scattering by an element is compared at short and long wave lengths, and (2) the temperature variations in the scattering by some element is measured and compared to the theory.

3664

RESPONSE OF ORGANIC SCINTILLATORS TO d-d NEUTRONS. R. A. Allen, L. E. Beghian, and J. M. Calvert. Proc. Phys. Soc. (London) A65, 295-6(1952) Apr. 1.

The organic compounds anthracene, trans-stilbene, and diphenyl acetylene were used as scintillators for d-d neutrons. An occluded target was used with deuterons of 150-kev energy, and the recoil pulse-height spectra were investigated. The pulse-height distributions are plotted and, for stilbene, the form of the distribution shows that pulse height is closely proportional to scintillation energy while, for anthracene, the rise at low energies indicates that the pulse height is a more rapidly increasing function of energy.

NUCLEAR PHYSICS

3665

Radiation Lab., Univ. of Calif.

SUMMARY OF THE RESEARCH PROGRESS MEETINGS FOR JANUARY 1952, by S. Shewchuck. Apr. 8, 1952. 8p. (UCRL-1752)

Gamma-Ray Scintillation Spectroscopy by D. F. Martin. A comparison of the relative merits of a gas proportional counter and a crystal diffraction spectrometer for counting incident γ rays is made. A few details concerning the component parts of the scintillation counter system are also given. Report on Synchrotron by C. M. McFarland. Brief statements are made concerning the operational characteristics of the synchrotron. Brief summaries quoted from UCRL reports or published literature are given for the talks entitled: An Experiment to Detect Direct Pair Production by Electrons; Electron Radiation in the Synchrotron; and Neutral Meson Gamma Ray Spectra from Proton Bombardment of Carbon.

3666

Oak Ridge National Lab.

LOW-TEMPERATURE PHYSICS, STABLE-ISOTOPE CROSS SECTIONS, AND THEORETICAL PHYSICS, sects.8, 9, and 13 of PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 10p. (ORNL-1164(sects.8, 9, and 13))

Specific-heat measurements on Nd ethyl sulfate and Nd sulfate between 1 and 2°K are reported; a very large hfs coupling is indicated in the former. Studies of heat-leak problems involved in the use of metal Dewar vessels at very low temperatures are discussed. A diagram of a shield assembly to reduce radiation heat losses to samples is included. The pile oscillator has been used to measure the thermal-neutron capture cross sections of several separated isotopes. Brief summaries are given of work by the theoretical group, dealing with internal-conversion angular coefficients, one-three γ-γ angular correlation, nuclear polarization and alignment, inner bremsstrahlung in β decay, triplet force between like nucleons, angular correlation in neutron decay, and detection of circularly polarized γ rays.

3667

β-RAY SPECTRUM AND ft-VALUES IN THE FORBIDDEN TRANSITIONS. Seitaro Nakamura, Hisao Takebe, and Minoru Umezawa. Progress Theoret. Phys. (Japan) 6, 604-13(1951) July-Aug.

It is shown that the β spectra of Tc^{99}, Sb^{124} in the second forbidden transition, and Tm^{170} in the first forbidden transition, can be explained by the tensor or vector interaction of the Fermi theory, if a suitable linear combination of matrix elements are chosen. Using the ratio of the matrix elements to provide a good fitting with the experimental spectra, ft values of each β decay are evaluated on the corrected forbidden formula. Criticism is made of the explanation of the β spectrum of Bi^{210} by Konopinski and Uhlenbeck. (auth)

3668

RANGE-ENERGY STUDIES OF FISSION FRAGMENTS. Robert Briggs Leachman, Ph.D. Thesis, Iowa State Coll., 1951.

A mathematical comparison of the known distributions of fission fragment mass and ionization provides information on the conversion factor between energy and ionization. Range-ionization data were obtained for fission fragments stopped in A, He, and N. About 15 photographs for each stopping gas were analyzed and no difference could be detected between the normalized range-ionization curves for heavy and light fragments. The normalized range-ionization curves for He and N were the same and nearly quadratic in form, but a different curve, more linear near zero range, was found for A.

3669

THE PHOTODISINTEGRATION OF THE DEUTERON, AND THE MEASUREMENT OF γ-RAY ENERGIES WITH PHOTOGRAPHIC EMULSIONS CONTAINING HEAVY WATER. W. M. Gibson, T. Grotdal, J. J. Orlin and B. Trumpy. Phil. Mag. (7) 43, 457-66(1952) Apr.

Photographic plates soaked in heavy water have been used in a study of the photodisintegration of deuterons by γ rays of energy 6.1 and 7.0 Mev. The principles of the method were described in an earlier paper, but the technique has been improved and the accuracy of the results increased. The method has been shown to be valuable for the measurement of γ-ray energies in the interval 4 to 12 Mev. The accuracy obtained at 6 Mev is about 40 kev, while γ-ray lines with an energy difference of 0.4 Mev could be resolved. The angular distribution of the protons has been measured, and the values $a/b = 0.05^{+0.03}_{-0.02}$ and $k = 0.02 \pm 0.08$ have been obtained for the constants in the equation $\sigma(\phi) = a + b \sin^2 \phi(1 + k \cos \phi)$. (cf. NSA 5-3521) (auth)

3670

ON MIRROR NUCLEI OF HIGHER ORDER. B. S. Dzhelepov. Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 15, 496-504(1951) July-Aug. (in Russian)

Mass differences, proton binding energies, threshold energies for decay, and decay energies of isobaric nuclides differing by 2, 3, 4, and 5 protons are discussed.

NUCLEAR PROPERTIES

3671

Argonne National Lab.

THERMAL NEUTRON ABSORPTION CROSS SECTION OF DEUTERIUM, by Louis Kaplan, K. E. Wilzbach and G. R. Ringo. Apr. 1952. 4p. (AECU-2019; UAC-562)

A value of 0.57 ± 0.01 mb has been obtained for the cross section of deuterium for 2200 m/sec neutrons by a comparison of tritium production by neutron irradiation of heavy water with that from a lithium solution. (auth)

3672

Radiation Lab., Univ. of Calif.

SUMMARY OF THE RESEARCH PROGRESS MEETING OF MARCH 6, 1952, by Sergey Shewchuck. Apr. 8, 1952. 6p. (UCRL-1751)

Summaries from UCRL reports for the talks Products of Carbon Disintegration by 330-Mev Protons by W. Barkes and Stopping Power of Compounds for the 340-Mev Proton Beam by T. J. Thompson are given.

3673

Palmer Physical Lab., Princeton Univ.

EXCITED STATES OF THE LITHIUM ISOTOPES, by W. Franzen and J. G. Likely. [nd] 1p. (NYO-3008)

The energy distribution of particles emitted on proton bombardment of a thin lithium foil has been examined by means of a scintillation-counter particle spectrometer. This spectrometer employs NaI crystals permanently mounted in a sealed dry housing on a photomultiplier tube. The energy response of the crystals was studied by bombarding them with protons of various energies. Particle spectra were thus recorded at 30, 60, 90, 120 and 150° in the laboratory system. Identification of particles was accomplished by observing the dependence of their energy on the angle of observation, and by measuring the slope of their range-energy curve at a known energy by means of thin aluminum foils. At a bombarding energy of 18.3 Mev and with an energy resolution of 3%, inelastic scattering of protons from levels in Li^7 at 4.5 and 6.5 Mev was observed. The level at 6.5 Mev appears to have a considerable natural width. A level in Li^6 at 2.1 Mev gives rise both to an inelastic group of protons and to a group of deuterons from the reaction $Li^7(p,d)Li^6$. In addition, deuteron groups corresponding to transitions to the ground state and a 3.6-Mev excited state of Li^6 were observed. The deuteron group which leaves Li^6 in the ground state is evident at all forward angles up to 90° in the laboratory system. (Entire report)

3674

Oak Ridge National Lab.

NEUTRON-DIFFRACTION STUDIES AND A CRYSTAL SPECTROMETER AS A SOURCE OF MONOENERGETIC THERMAL NEUTRONS, sects.6 and 7 of PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 10p. (ORNL-1164(sects.6 and 7))

Preliminary results of neutron free-scattering cross-section measurements of Pb, Bi, Ni, Cu, Fe, Th, and graphite by an In absorption method are tabulated. Neutron-powder-diffraction patterns have been obtained for pure samples of V, Cr, Nb, Mo, and W at a series of reduced and elevated temperatures in an investigation of their possible magnetic structures. The pattern for Cr showed a weak but definitely measurable antiferromagnetic (100) reflection. A combination mirror and diffracting-crystal arrangement has been developed to permit neutron cross-section measurements as a function of neutron energy with high resolution and without the parasitic second-order effects that are obtained with single-crystal diffraction. The arrangement of the spectrometer and mirrors is shown schematically, and the results of measurements of total neutron cross sections as a function of neutron wave length for In, Au, and Ag are given.

3675

Notre Dame Univ.

CHEMICAL KINETICS OF ATOMIC BROMINE FROM NUCLEAR ISOMERIC TRANSITION, by William H. Hamill and Jay A. Young. [nd] 23p. (AECU-1985)

Chemical evidence indicates that the nuclear isomeric transition of Br^{80} is completely converted. Although isomeric transition always produced C-Br bond rupture in $CH_3Br(g)$ it often fails to rupture HBr(g). Other results are consistent with the interpretation that daughter Br^{80} particles, following bond rupture, usually become free, thermal atoms. Their kinetic behavior with C_2H_4-HBr mixtures corresponds to the analogous $Br^{79}(n,\gamma)Br^{80}$ kinetics (R. R. Williams and W. H. Hamill, J. Chem. Phys. 18, 783(1950)). Using daughter Br^{80} it is shown that bromine addition at the C=C double bond does not involve the Br_3 complex. The $HBr^{82}-Br_2$ exchange was found to be complete in two minutes. (auth)

3676

Los Alamos Scientific Lab.

CROSS SECTIONS OF THE $D(t,n)He^4$ REACTION FOR 80- TO 1200-KEV TRITONS, by H. V. Argo, R. F. Taschek, H. M. Agnew, A. Hemmendinger, and W. T. Leland. [nd] 21p. (AECU-2006; LADC-1122)

An abstract of this report was indexed as report AECU-1964 and appears in Nuclear Science Abstracts of June 15, 1952.

3677

THE NUCLEAR MAGNETIC MOMENT OF $^{197}_{79}Au$. F. M. Kelly. Proc. Phys. Soc. (London) A65, 250-4(1952) Apr. 1.

The hyperfine structure of the 6s and 7s levels of Au^{197} has been measured. The values of the nuclear magnetic moments calculated from the structure of these two levels using the Goudsmit-Fermi-Segrè formula agree. Since the Fermi-Segrè factor is very large (1.424) for the 6s level and small (1.038) for the 7s level, this affords a good check on the validity of the method introduced by Crawford and Schawlow for the evaluation of this factor. When the corrections for the finite size of the nucleus are included, the spectroscopic value of the nuclear magnetic moment of Au^{197} is +0·136 n.m. (auth)

3678

CHEMICAL EFFECTS IN NUCLEAR MAGNETIC RESONANCE AND IN DIAMAGNETIC SUSCEPTIBILITY. Norman F. Ramsey. Phys. Rev. 86, 243-6(1952) Apr. 15.

An expression for the magnetic shielding of nuclei in solids and in molecules is developed, and an approximation is obtained that is particularly suited to substances containing heavy atoms. The temperature dependence of the magnetic shielding which arises when there are several low-lying states of the molecules is discussed. It is shown that only slight changes in the various formulas make them applicable to the diamagnetic susceptibility. (auth)

3679

PARAMAGNETIC RESONANCE AT LOW TEMPERATURE OF PRASEODYMIUM CHLORIDE HYDRATE. Charles F. Davis, Arthur F. Kip, and Renato Malvano. Atti accad. nazl. Lincei, Classe sci. fis. mat. e nat. (8) 11, 77-9(1951) July-Aug. (In Italian)

Paramagnetic resonance studies of $PrCl_3.7H_2O$ at 4°K showed that its fundamental state is at least doubly degenerate, that the crystal is magnetically anisotropic, and that the nuclear spin of Pr^{141} is $\frac{5}{2}$.

3680

THE EFFECTS OF CONFIGURATION INTERACTION ON THE ATOMIC HYPERFINE STRUCTURE OF GALLIUM. G. F. Koster. Phys. Rev. 86, 148-54(1952) Apr. 15.

The effects on the hyperfine structure of the mixing of higher configurations with the ground configuration $(4s)^2 4p$ of gallium are studied. It is found that the only configuration which need be considered is the 4s4p5s. A Hartree wave function for the excited 5s-state of gallium is calculated, and the extent of the mixing of this excited configuration with the ground configuration is determined. The coupling constants for magnetic and electric quadrupole hyperfine structure are computed with the use of the wave function for the ground state of gallium including the excited configuration. The determination of quadrupole moments from atomic hyperfine structure measurements is discussed and various methods of making this calculation compared. Besides the determination of the quadrupole moments of gallium, the quadrupole moments of aluminum, indium, and chlorine are estimated. (auth)

3681

NEW ENERGY LEVEL IN ^7Li. A. Ashmore, and J. F. Raffle. Proc. Phys. Soc. (London) A65, 296-7(1952) Apr. 1.

A Be target was bombarded with 5.31 ± 0.07-Mev deuterons, and the α-particle spectrum was obtained by magnetic analysis in a direction at 90° to the incident beam. The peak at a magnetic field of 956 ± 4 corresponds to an α-particle energy of 4.04 ± 0.04. This gives a Q value for the reaction $Be^9(d,\alpha)Li^7$ of 2.56 ± 0.10 Mev. A Q value of 7.15 Mev for the transition to the ground level of Li^7 gives a value of 4.59 ± 0.10 Mev for the excitation energy of the new level.

NUCLEAR REACTORS

3682

Tata Inst. of Fundamental Research, Bombay (India)

LECTURES ON THE THEORY OF NUCLEAR REACTORS; WINTER TERM (1951-52), by C. Salvetti. Tata Inst. of Fundamental Research, Bombay (India) and Univ. of Milan (Italy). [nd] 170p. (NP-3826)

The organization of this series of lectures is similar to that of a textbook. It is a comprehensive treatise on elementary reactor theory. The first section, consisting of 68 pages, deals with slowing down of neutrons and includes several methods for calculating the neutron energy distribution. The second section, entitled "Multiplying Media," includes chapters on calculation of the coefficients for homogeneous and heterogeneous media, thermal distribution in infinite and finite media, and exponential experiments. "Some Topics about the Nuclear Reactor" is the title of the third section. Some of the topics considered are as follows: the reactor in the steady state, effective multiplication factor, power produced, pile with a reflector and the multigroup and one-group methods, and transient behavior of a thermal reactor.

3683

NORWAY'S ATOMIC PILE. Gunnar Randers and Nils Hidle. Intern. Chem. Eng. and Process Inds. 33, 123-6 (1952) Mar.

The design and construction of Norway's nuclear reactor, known as the JEEP, is discussed. It is a slow neutron reactor using uranium metal as the fissionable material, heavy water as the moderator, and graphite as reflector. It is designed for a power of 100 kw, and power/ton of fissionable material is about 50 kw/ton uranium metal. It is cooled by circulating the heavy water through a heat-exchanger system.

NUCLEAR TRANSFORMATION

3684

Northwestern Univ.

STUDIES OF THE $Li^6(n,\alpha)H^3$ REACTION AND NEUTRON ENERGY MEASUREMENTS WITH NUCLEAR EMULSIONS, by James H. Roberts. Sept. 15, 1951. 64p. (AECU-2007; Progress Report No. 2)

The angular distribution for the $Li^6(n,\alpha)H^3$ reaction is being measured at neutron energies of 200, 270, 400, and 600 kev. The results indicate a high yield for tritons in the forward direction, a minimum around 100° between the neutron and triton (c.m. system), and a smaller maximum in the backward direction. A fair fit to the data is obtained by $\alpha + \beta \cos\Phi_0 + \gamma \cos^2\Phi_0$, where α, β, and γ are constants and Φ_0 is the angle between the neutron and triton (c.m). Preliminary results of comparisons of the discrimination between the α and H^3 tracks achieved by using different plate developers are presented. Brief report is made of incomplete tests to determine the feasibility of swelling the processed Li^6 plates by soaking them in a mixture of glycerine and water; this technique offers hope of reducing instrumental errors for neutron spectroscopy when the neutrons are incident isotropically in a plate. Various families of curves and some nomographs have been produced to aid in the analysis and quick reduction of data; much of this information is included in the report. Energy levels in C^{12} using $Be^{9}(\alpha,n)C^{12}$ have been studied. A thin Po source and thin Be target were used and knock-on proton tracks in photographic plates were measured. Levels in C^{12} were found at 4.3 and 7.5 Mev.

3685

Atomic Energy Research Establishment, Harwell, Berks (England)

CROSS SECTIONS FOR THE PHOTODISINTEGRATIONS $^{12}C(\gamma,3\alpha)$ AND $^{16}O(\gamma,4\alpha)$, by F. K. Goward and J. J. Wilkins. Mar. 24, 1952. 12p. (AERE G/M-127)

Bremsstrahlung spectra with peak energies 21, 24-26, 33, and 70 Mev were used to obtain the reactions. More than 1700 $C^{12}(\gamma,3\alpha)$ and 600 $O^{16}(\gamma,4\alpha)$ stars were measured and analyzed. The results give evidence for multiple resonances spaced at about 1 Mev intervals in the dependence of cross section on γ-ray energy for both reactions. An estimate of the resolution obtained in the bremsstrahlung experiments (~1 Mev) has been made from measurements on some 470 stars produced by $Li^{7}(p,\gamma)Be^{8}$ γ-rays. These results are also used to confirm the existence of a minimum in the $C^{12}(\gamma,3\alpha)$ cross section at about 17.6-Mev γ-ray energy. The integrated cross section for $O^{16}(\gamma,4\alpha)$ may be expressed as $\sim 2.5 \times 10^{-3}$ Mev-barns, which is much smaller than the value (~0.1 Mev-barns) found by Gaerttener and Yeater (Phys. Rev. 77, 714(1950)) for 4-particle stars from O^{16}.

3686

Wisconsin Univ.

ENERGY LEVELS IN Si^{28} EXCITED BY ALPHA PARTICLES ON Mg^{24}, by S. G. Kaufmann, E. Goldberg, L. J. Koester and F. P. Mooring. [nd] 15p. (AECU-2015)

An abstract of this report was indexed as report AECU-1042 and appears in Nuclear Science Abstracts as NSA 5-1358.

3687

Institute for Nuclear Studies, Univ. of Chicago

IDENTIFICATION AND YIELDS OF $(\gamma,\alpha n)$ REACTIONS, by R. B. Holtzman and Nathan Sugarman. [nd] 19p. (AECU-2005)

The $(\gamma,\alpha n)$ reaction was studied in several nuclides by irradiation with photons of 48- and 87-Mev maximum energy. By use of radiochemical techniques it was shown that C^{11} is produced from oxygen, F^{18} from sodium, P^{30} and P^{32} from chlorine, Ga^{70} from arsenic, As^{74} and As^{76} from bromine, and Zr^{87} from molybdenum. Except for P^{32}, it is proposed that these nuclides are produced by the $(\gamma,\alpha n)$ reaction. The yields of these nuclides relative to N^{13} from the $N^{14}(\gamma,n)N^{13}$ reaction, and those of other nuclides observed in this study are given. (auth)

3688

Oak Ridge National Lab.

SHORT-LIVED ISOMERS AND DIRECTIONAL ANGULAR CORRELATION OF SUCCESSIVE GAMMA RAYS, SHORT-PERIOD ACTIVITIES, AND HIGH-VOLTAGE ACCELERATOR PROGRAM, sects.3, 4, and 5 of PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 17p. (ORNL-1164(sects.3, 4, and 5))

The Re^{187} (5.5×10^{-7} sec) isomer has been classified as a M1 with some E2 transition, and studies of the angular distribution between the successive γ rays from Hf^{177} and of the K-shell internal conversion coefficients have thrown light on the transition scheme associated with the decay of the 318-kev excited level in Hf^{177}. The 0.9-sec activity in neutron-irradiated Pb has been assigned to a fast-neutron reaction with Pb^{207}, and the 210-kev transition in the 2.5-sec isomer of Er has been shown to be of E3 character. The new 6-Mev van de Graaff generator has been placed in operation and the results of investigations of the following reactions are presented: $Li^{7}(p,n)$; $Be^{9}(p,n)$; $Be^{9}(p,\gamma)$; $F^{19}(p,\gamma)$. Report is made of studies of the $He^{3} + He^{3}$ and the $He^{3} + H^{2}$ reactions with the Cockcroft-Walton accelerator.

3689

FISSION PRODUCT YIELDS AND SHELL STRUCTURE IN ATOMIC NUCLEI. H. G. Thode. Trans. Roy. Soc. Can. III 45, 1-17(1951) June.

A review of work carried on at McMaster University on nuclear chemical problems and more recent developments are discussed. Fission-product chains for Cs and Rb have been studied, and fission product yields are discussed. Evidence is presented for the existence of nucleonic shells. A summary of mass-spectrometer fission-yield data for Xe isotopes is included. showing evidence for fine structure in the mass-yield curve. Studies of isotope abundance in samples of pitchblende of different ages is presented, showing fission yields.

3690

EXCHANGE COLLISIONS OF FAST NUCLEONS WITH DEUTERONS. I. I. Ya. Pomeranchuk. Zhur. Ekspt'l. i Teoret. Fiz. 21, 1113-22(1951) Oct. (In Russian)

Spin exchange and calculation of cross sections for exchange collision of protons or neutrons with deuterons or free nucleons are discussed.

3691

ON THE PRODUCTION OF NEGATIVE PROTONS. Mituo Taketani and Shigeru Machida. Progress Theoret. Phys. (Japan) 6, 559-71(1951) July-Aug.

Cross sections for the production of negative protons in various processes were calculated assuming the pseudoscalar meson theory. In the lack of a satisfactory theory for the high-energy processes considered, the Weizsäcker-Williams method is employed. Taking account of the reactions and the nonlinearities of the meson field phenomenologically, to some extent, the case of modified meson spectrum as suggested by Heisenberg is treated. Obtained cross sections for the production of negative protons by nucleon-nucleon collisions are smaller, by a factor of about 10^{-4} in the case of a modified meson spectrum, than those in the case of neglecting the reactions and nonlinearities of the meson field. Also the cross section for the production of negative protons by proton-proton collisions near threshold is calculated by the method of Feynman's relativistic perturbation. (auth)

PARTICLE ACCELERATORS

3692

Concordia Coll.

TECHNIQUES OF PARTICLE ENERGY CONTROL WITH VAN DE GRAAFF ACCELERATORS; NUCLEAR SCIENCE SERIES PRELIMINARY REPORT NO. 12, by Carl L. Bailey and John H. Williams. Concordia Coll. and Univ. of Minnesota. 1952. 9p. (NP-3823; Preliminary Report No. 12)

Techniques of particle-energy control which allow precise measuring of nuclear-reaction energies are outlined. Inhomogeneity of the ion energy in a Van de Graaff accelerator may be caused by conditions in the probe and ion source, by scattering of the ions as they travel from source to target, or by fluctuations in the over-all voltage of the accelerator. The first two sources of inhomogeneity are considered briefly, and the third is discussed at more length. The electrostatic analyzer used to control the University of Minnesota Van de Graaff is diagramed and described, and other techniques of ion-energy control are discussed briefly. Precautions necessary to prevent formation of a surface layer of C on the target are indicated. A few examples of nuclear studies which are well adapted to the use of monoenergetic ion beams are discussed.

3693

Research Foundation, Ohio State Univ.

RADIOAUTOGRAPHIC METHOD FOR EXAMINING DISTRI-

BUTION OF PARTICLES IN A CYCLOTRON BEAM, by M. L. Pool and S. Fultz. Mar. 1952. 20p. (NACA-TN-2650)

The relative distribution of particles emitted from activated metal foil has been obtained by the use of radioautographs of the foil, and hence the time-averaged distribution of particles in the cyclotron beam which causes activation of the foil can also be obtained. This has been established for Kodak Super Pan Press B film provided the maximum photographic density of the radioautograph is kept below 1 : 1. The method has been confirmed by direct comparison of density values and count rates and has also been verified for higher-energy components of the β rays emitted from the foils. (NACA abst.)

3694

Radiation Lab., Univ. of Calif.

A HIGH INTENSITY PULSED ION SOURCE, by James D. Gow and John S. Foster, Jr. Mar. 14, 1952. 21p. (UCRL-1698)

The design of a high-intensity pulsed ion source is described. The source has been used in the 4-Mev Berkeley electrostatic generator, which in turn is used as an injector for the 32-Mev proton linear accelerator. A Penning or Phillips ion gage was chosen as the basis for the design. A cross-sectional diagram of the ion source and performance curves (proton current vs. probe voltage) are also given.

3695

SIMPLE VAN DE GRAAFF GENERATORS WITH DOUBLE-SIDED BAND CHARGING. A. Flammersfeld and G. Weber. Z. Naturforsch. 7a, 161-4(1952) Feb. (In German)

In the usual Van de Graaff generator the breakdown potential of the field between the ascending and descending bands limits the charging rate. If this field is extended beyond the bands, the rate can be increased. Two arrangements of charged cylinders or bars by which this can be accomplished are described. About 1.7 times the original charging rate has been obtained.

3696

MOTION OF CHARGED PARTICLES IN MAGNETIC FIELD OF LINEAR CONDUCTOR AND ELECTRIC FIELD OF CYLINDRICAL CONDENSER. V. M. Kel'man and I. V. Rodnikova. Zhur. Eksptl'. i Teoret. Fiz. 21, 1364-9(1951) Dec. (In Russian)

Calculated motions are plotted for various parameters.

3697

DETERMINATION OF ION PATHS IN CROSSED ELECTRIC AND MAGNETIC FIELDS. M. E. Reinders, C. J. Zilverschoon, and J. Kistemaker. Applied Sci. Research (Netherlands) B2, 264-8(1952)

Ion paths in crossed electric and magnetic fields were calculated, using a step-by-step method. Two examples are given: the ions in a Nier-source and the ions passing the acceleration electrode of an electromagnetic isotope separator. The magnetic field was homogeneous; the electric field was determined by means of a resistor network. (auth)

3698

A RADIO-FREQUENCY POWER SUPPLY SYSTEM FOR HIGH VOLTAGE ACCELERATORS. P. A. Davenport. Brit. J. Applied Phys. 3, 124-6(1952) Apr.

An r-f power supply system for operating an ion source on a h-v accelerator is described. A multi-channel link for r-f power is provided between the ground and the h-v terminal, each separate power requirement of the ion source assembly having its own channel. Oscillators at ground potential provide the power, and adjustment of their outputs gives positive control of the beam intensity and focus. (auth)

3699

APPLICATION OF THE W.B.K. METHOD TO THE DYNAMICS OF LINEAR ACCELERATOR. Max Hoyaux. Rev. Sci. Instruments 23, 173-5(1952) Apr.

The dynamics of "small motions" in a linear accelerator is studied in as general conditions as possible. It is concluded that heavy particles cannot be accelerated up to the bev range by any practical combination of Tm and/or Te traveling and/or stationary waves. Several methods are however possible for electrons. In the case of heavy particles, charges or currents must be introduced inside the beam. Two methods seem promising, (a) the Berkeley device (foils or grids) in which the beam expands as the power (⅛) of energy, and (b) a coaxial structure with d-c bias (≃100 kv) in which the beam radius remains approximately constant. The focusing by means of a d-c current parallel to that of the beam is not practical. (auth)

3700

ABERRATION OF A CORPUSCULAR BEAM OF ARBITRARY SHAPE IN AN ARBITRARY ELECTROSTATIC FIELD. A. M. Strashkevich and I. M. Pilat. Izvest Akad. Nauk S.S.S.R. Ser. Fiz. 15, 448-66(1951) July-Aug. (In Russian)

RADIATION ABSORPTION AND SCATTERING

3701

ON THE THEORY OF MULTIPLE SCATTERING OF ELECTRONS. L. M. Biberman. Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 15, 424-8(1951) July-Aug. (In Russian)

3702

THE ANGULAR DISTRIBUTION OF SCATTERED NUCLEONS IN HIGH ENERGY NUCLEAR COLLISIONS. H. Messel and H. S. Green. Proc. Phys. Soc. (London) A65, 245-9(1952) Apr. 1.

The theory of the mean square angle of emission of nucleons resulting from a high-energy nucleon-nucleus collision is developed. Graphical results are given both for light and for heavy nuclei. (auth)

3703

EFFECT OF ELECTRON EXCHANGE ON INELASTIC SCATTERING OF ELECTRONS IN METALS. A. Ya. Vyatskin. Zhur. Eksptl'. i Teoret. Fiz. 21, 1350-3(1951) Dec. (In Russian)

Equations for the exchange effects in interaction of 0.1- to 3-kev electrons with the metal lattice are derived.

3704

MULTIPLE SCATTERING OF RADIATION BY AN ARBITRARY PLANAR CONFIGURATION OF PARALLEL CYLINDERS AND BY TWO PARALLEL CYLINDERS. Victor Twersky. J. Applied Phys. 23, 407-14(1952) Apr.

The formal solution for the scattering of a plane wave by an arbitrary configuration of parallel cylinders previously presented is specialized to consider the case where all the axes lie in the same plane. The scattered wave is expressed as an infinite sum of orders of scattering, the first order being the usual single scattering approximation. It is shown that the far field form of the multiply scattered orders is symmetrical with respect to the plane of the configuration for minimum spacing large compared to wavelength. Hence, for the analogous configuration of bosses on a perfectly conducting plane, departures from the predictions of single scattering theory should occur primarily for the component polarized perpendicular to the elements. The problem of two cylinders is considered in detail, the multiply scattered orders being summed explicitly subject to the above conditions. Approximate solutions for radii very small compared to wavelength are derived, the wavelengths for which the effects of multiple scattering are greatest are investigated, and a criterion for the use of the single scattering hypothesis presented. Solutions for two bosses and a single cylinder parallel to a nonabsorbing plane are also stated. Both the electromagnetic and acoustic cases are treated. (auth)

3705

DESTRUCTION OF NEGATIVE IONS BY COLLISIONS WITH ATOMS. V. M. Dukel'skiĭ and E. Ya. Zandberg.

Zhur. Eksptl'. i Teoret. Fiz. 21, 1270-83(1951) Nov. (In Russian)

During passage of Na^-, K^-, F^-, Cl^-, Br^-, and I^- ions through He or A at ~10^{-3} mm Hg, the appearance of slow electrons was observed. The electrons were shown to arise from destruction of the negative ions by collision with atoms, and the cross sections for the process were determined. As an example, for Na^- and I^- ions of 300- to 1300-ev energy the cross section was found to be of the order of 10^{-16} to 10^{-15} cm^2 and to be directly proportional to the energy of the ion. A threshold energy of 290 ev was observed for I^- ions in He.

RADIATION EFFECTS

3706

National Bureau of Standards

PENETRATION AND DIFFUSION OF X-RAYS; MATHEMATICAL TECHNIQUES, by L. V. Spencer. Mar. 3, 1951. 14p. (NP-3762)

The following topics on a method of approximating distributions are discussed: the meaning of the Gauss-Szego-Chandrasekhar method for evaluating integrals and a generalization to include other than Dirac delta functions. A technique is presented for systematically solving, numerically, the x-ray problem of backscatter from a surface. This method is applied to the simple problem of isotropic scattering with no energy loss. (cf. TIP U10982) (NRS abst.)

3707

THE RELATIVE IONIZATION PRODUCED BY LOW ENERGY PROTONS, DEUTERONS AND ALPHA-PARTICLES IN VARIOUS GASES. P. R. Tunnicliffe and A. G. Ward. Proc. Phys. Soc. (London) A65, 233-40(1952) Apr. 1.

Monoenergetic neutrons have been used to produce recoil protons, deuterons, and α particles in a proportional counter. The maximum pulse sizes produced by the different recoil particles are compared with the accurately known ratios of maximum recoil energies. From the results for protons and deuterons it can be inferred that, for protons between 200- and 550-kev energy, the ionization is proportional to the energy with a deviation of less than 1%. The total ionization in argon produced by a proton is about 8% greater than that of an α particle of equal energy, for energies between 200 and 400 kev. (auth)

3708

THE PHOTO-DISINTEGRATION OF NITROGEN-14 NUCLEI. D. L. Livesey and C. L. Smith. Proc. Phys. Soc. (London) A65, 297-8(1952) Apr. 1.

Two groups of multiple disintegration stars were observed in nuclear emulsions bombarded by x rays. The first group of 4-particle stars is supposed to be due to the reaction $N^{14} + h\nu \rightarrow H^2 + 3He^4 - 17.6$ Mev. The second group of N^{14} stars consists of 3 particles each. The longest track is that of a proton. By applying momentum conservation laws, the track of intermediate length is found to agree with that of α particles, and the short track corresponds to that produced by ions of mass number between 8 and 10. The stars are found to be probably due to the reaction $N^{14} + h\nu \rightarrow H^1 + He^4 + Be^9 - 18.4$ Mev.

3709

BLUE GLASS WHICH FADES UPON NUCLEAR RADIATION. K. O. Otley and W. A. Weyl. J. Applied Phys. 23, 499(1952) Apr.

Blue glass which probably owes its color to the presence of S_2 molecules was found sensitive to x and γ rays. Normally its absorption spectrum has a broad maximum between 5000 and 6000 A, but upon irradiation with x or γ rays the intensity of this absorption band decreases. The change can be observed either with a visual or a photoelectric photometer.

3710

PRODUCTION OF THE JOSHI EFFECT UNDER β- AND γ-RAYS. V. G. Bhide, M. R. Bhiday, and G. V. Asolkar. Nature 169, 542-3(1952) Mar. 29.

An investigation was made on the Joshi Effect under β and γ rays, using first a β-ray capsule with negligible γ-ray activity. Siemens ozonizer type tubes charged with various vapors and gases were used, and exposure to β rays caused an instantaneous and reversible positive effect ($+\Delta i$) at relatively low voltage. With slight increase of voltage $+\Delta i$ diminished and finally changed over to $-\Delta i$ above V_m, the threshold for a self-maintained discharge. In an electronegative gas, only $-\Delta i$ is detected, decreasing with the overvoltage $V-V_m$. Essentially similar results are obtained under γ rays.

RADIOACTIVITY

3711

Argonne National Lab.

THE DECAY OF SPONTANEOUS EMISSION, by E. J. Hellund. Mar. 1952. 20p. (AECU-1999; UAC-542)

A critical examination of the theory of resonance radiation was carried through employing the mathematical technique of Laplace and Stieltjes transforms. Particular attention has been devoted to the question of the temporal behavior of the excited state. With no restrictions on the interaction between atom and radiation field other than that it be real, and that processes of sufficiently high frequency contribute only negligible effects, one can prove that the probability amplitude of the excited state can not decay according to the general law $\sum_{\mu\nu} C_{\mu\nu} t^{\lambda_\mu} e^{-\beta_\nu t}$ where the λ_μ and β_ν are complex constants lying in the right half-plane and the $C_{\mu\nu}$ are arbitrary complex coefficents. The deviation from the law just cited can be termed a straggling phenomenon since exact analysis shows that the probability amplitude, for sufficiently long times, is greater than that defined according to the radioactive decay law. (auth)

3712

Oak Ridge National Lab.

SCINTILLATION SPECTROMETRY AND ELECTRONIC DEVELOPMENT, sects.1 and 2 of PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 20, 1951. C. G. Shull, ed. Issued Apr. 30, 1952. 14p. (ORNL-1164(sects.1 and 2))

The results of scintillation-spectrometer studies of the natural γ radiations from U^{234}, U^{235}, and U^{238} are presented in the form of graphs and tables. A method for determining K-capture transition energies by investigating the "inner bremsstrahlung" spectrum is discussed and illustrated by graphs of the Fe^{55} γ continuum. The coincidence scintillation spectrometer has been used to measure the K-shell internal conversion coefficient for the two cascaded γ rays from I^{131}; the 80-kev γ is M1. Report is made of further studies of the K^{40} γ spectrum and an upper limit is indicated for the amount of annihilation radiation present. Electronic developments on single and multichannel analyzers, discriminator-tube drifts, and scalar improvements are briefly described.

3713

INVESTIGATION OF THE RADIOACTIVE RADIATIONS OF Ir^{192}, Ag^{110}, AND In^{114}. V. S. Shpinel and N. V. Forafontov. Zhur. Eksptl'. i Teoret. Fiz. 21, 1376-83(1951) Dec. (In Russi

Conversion-electron and β spectra of Ir^{192}, Ag^{110}, and In^{114}, as determined with a β spectrometer having a transverse inhomogeneous field, are presented. 8 figures.

3714

RADIOACTIVE DEPOSITS FOUND AT OTTAWA AFTER THE ATOMIC EXPLOSIONS OF JANUARY AND FEBRUARY 1951. D. C. Rose and J. Katzman. Can. J. Phys. 30, 111-16(1952) Mar.

Gamma-ray counter equipment, in continuous operation at Ottawa, Canada, indicated that considerable radioactive matter fell on January 29 and again on February 7. The decay period of this material was measured and is consistent with the assumption that the material consisted mainly of products of fission. The fall on January 29 came from an explosion on January 27 and the February 7 material appeared to be three to five days old. The quantity can be estimated only very roughly and is thought to be of the order of one microgram radium equivalent per square meter. (auth)

3715

THE α-ACTIVITIES OF THE TWO LONG-LIVED STATES OF $^{211}_{84}$PO. N. Feather. Phil. Mag. (7) 43, 476-8(1952) Apr.

The two isomeric states of Po^{211} differ markedly in the difficulty of formation of the outgoing α-particle. The degree of forbiddenness due to a change of spin of j quantum units can be represented by a factor F in the disintegration constant λ such that $\log_{10} F = -C(Z-2)^{-1/2}\, \rho_0^{-1/2}\, j(j+1)\ldots.$, where ρ_0 is the nuclear radius, Z the atomic number of the disintegrating nucleus, and C = 0.70 ± 0.03 (in proper units). When isomeric states are compared (for Bi^{210} and Po^{211}) considerably different values of the difficulty factor are required. In both species the difficulty factor is greater for the state of lower spin (Bi^{210} and Po^{211*}).

3716

SOME DIRECTIONAL CORRELATION FUNCTIONS FOR SUCCESSIVE NUCLEAR RADIATIONS. F. G. Hess. Can. J. Phys. 30, 130-46(1952) Mar.

A method of evaluating the sums of angular momentum coefficients appearing in the directional correlation function for successive nuclear radiations is presented. The sums are evaluated for the simplest cases and α-γ and γ-γ correlation functions are calculated for these cases—the angular momentum quantum number of one of the emitted particles being arbitrary and that of the other being 1 or 2. (auth)

3717

INVESTIGATION OF $Eu^{152,154}$ RADIATION BY MEANS OF A PAIR β SPECTROMETER. L. Ya. Shavtvalov. Zhur. Eksptl'. i Teoret. Fiz. 21, 1123-6(1951) Oct. (In Russian)

The β-γ coincidences of $Eu^{152,154}$ were examined. The isolated β spectrum of Eu^{152} was simple, with maximum energy of 0.75 Mev, corresponding to allowed transition. The 336.4-kev γ line was in coincidence with β decay, whereas the 122-kev γ line was associated with K capture, in both cases of Eu^{152}. Decay schemes of Eu^{152} and Eu^{154} are shown.

3718

THE RADIOACTIVITY OF THE HERCYNIAN VOSGES. Jean-Pierre Rothé and Élie Peterschmitt. Compt. rend. 234, 1610-12(1952) Apr. 16. (In French)

The γ radiation of petrographic samples at 205 stations in the Vosges mountains, France, was measured with both a Kolhörster ionization chamber and a gammameter. Values from 1 to 49 ion pairs/cm^3/sec were found. The K_2O content of the rocks also was determined; some relation to the total activity is shown.

3719

ON THE RATIO BETWEEN K CAPTURE AND γ EMISSION OF K^{40}. M. Paganelli and G. Quareni. Nuovo cimento (9) 8, 598-600(1951) Aug. 1. (In Italian)

Preliminary results are reported of coincidence experiments carried out with 6×10^{-5} and 6×10^{-4} g/cm^2 layers of KCl. The experiments were made in a cavern under 150 m of dolomite to reduce cosmic-ray background, which was detected by triple coincidences. After allowing for random coincidences, the authors obtained the values 0.52 ± 0.16 and 1.20 ± 0.23 coincidences/hr for the respective thicknesses.

3720

LIGHT RADIOACTIVE ELEMENTS OF SHORT LIFE. John Valentine Jelley. Ph.D. Thesis, Cambridge Univ., 1950.

A description of techniques for study of short-lived activities is given. Some deuteron reactions of the (d,p) type are discussed, and the reaction $N^{15}(d,p)N^{16}$ is established. The reaction $B^{11}(d,p)B^{12}$ is discussed, and the half life for β decay of B^{12} is found to be 26.5 ± 1.5 msec; the thick-target excitation function was found to show resonance at 700 kv, and the cross section for the reaction at a deuteron energy of 65 kv was found to be 1.04×10^{-26} cm^2. A method for studying fast neutron reaction by means of complex neutron spectra is described. Finally, a study of the decay scheme of and the β and γ radiations from F^{20} is given.

3721

WIDTH OF γ LINES AND DOPPLER WIDENING OF CONVERSION ELECTRON LINES. V. S. Shpinel and R. L. Moshkina. Zhur. Eksptl'. i Teoret. Fiz. 21, 1127-31(1951) Oct. (In Russian)

A precision β spectrometer with a transverse inhomogeneous magnetic field was used to measure the conversion lines corresponding to the 287-kev γ transition in the ThC″ (Tl^{208}) nucleus. The expected widening of the conversion lines was not observed. From this it was estimated that the excited state of ThC″ must have a lifetime of $\sim 10^{-10}$ sec.

3722

THE SHAPES OF NEGATIVE BETA-SPECTRA AT THE LOW ENERGY END. Herman M. Schwartz. Phys. Rev. 86, 195-7(1952) Apr. 15.

The disposition of the excess atomic binding energy liberated in a negative beta decay is of interest in connection with the shape of the low-energy end of the beta spectrum. Previous theoretical work points to the carrying away of this energy by the beta particle in most cases, with a resulting practical cutoff at the low end of the energy spectrum. However, the present approach, in which the nuclear and atomic electron transitions are treated as a unified process, leads to the conclusion that to the first order that shape is practically unaffected. A possibility for experimental study of this question is pointed out. (auth)

3723

DISINTEGRATION SCHEME OF I^{131}. R. E. Bell and R. L. Graham. Phys. Rev. 86, 212-18(1952) Apr. 15.

The radiations of I^{131} (8-day) have been studied in a pair of lens beta-ray spectrometers placed end to end, with coincidence counting of the focused radiations from a single source. Coincidence beta spectra are shown with end points at 608 ± 5 kev (87.2 percent), 335 ± 6 kev (9.3 percent), and 250 ± 7 kev (2.8 percent). A weak 812 ± 15 kev beta spectrum (0.7 percent) apparently leads to the 12-day isomer of X^{131}. Relative intensities of the three main beta components are obtained from gamma-ray measurements alone. All gamma rays have their multipolarities assigned on the basis of measured K-conversion coefficients and K/L ratios. A consistent disintegration scheme is proposed which is an extension of that of Metzger and Deutsch. Single-particle orbital assignments are made to the lower excited states of Xe^{131} which agree with shell theory. (auth)

3724

SERIES OF CONSECUTIVE RADIOACTIVE TRANSITIONS $Zr^{95} \rightarrow Nb^{95} \rightarrow Mo^{95}$. V. S. Shpinel. Zhur. Eksptl'. i Teoret. Fiz. 21, 1370-5(1951) Dec. (In Russian)

The radiations of the $Zr^{95} \rightarrow Nb^{95} \rightarrow Mo^{95}$ transitions were studied with a thin-magnetic-lens β spectrometer. The β spectrum of Zr^{95} was complex, consisting of a component with maximum energy 365 ± 10 kev and ~95% intensity and two low-intensity components with maximum energies ~600 and 1100 kev. The Nb^{95} spectrum was simple with maximum energy 148 ± 5 kev. Weak conversion peaks corresponding to the 240-kev isomeric transition of Nb^{95m} were observed. For Zr^{95} and Nb^{95}, γ rays of nearly the same energy, 730 to 750 kev, were found. The results are discussed in terms of the nuclear shell model.

SHIELDING

3725

Lewis Flight Propulsion Lab., NACA

IMPLICATION OF THE TRANSPORT EQUATION FOR THE SEMIEMPIRICAL TREATMENT OF SHIELDS, by Philip Schwed. Mar. 1952. 31p. (NACA-TN-2647)

The semiempirical method of dealing with shields by treating them as composed of layers is revised and extended by taking the angular distribution of the radiation into account and by making use of the transport equation to obtain expansions suitable for special cases. Such expansions are given for the case where multiple scattering with angular deviation is of relatively little import and for the contrary case where this latter process dominates. A method for obtaining the parameters for layers of finite thickness from data on very thin layers is presented. The expansion used for the case where multiple scattering dominates is illustrated by consideration of a thick nonabsorbing neutron shield of high atomic weight. The physical significance of the expansion coefficients introduced is determined. (NACA abst.)

SPECTROSCOPY

3726

Argonne National Lab.

RESOLUTION OF A SCINTILLATION COUNTER SPECTROMETER, by Virginia Hummel and Bernard Hamermesh. Apr. 1952. 3p. (AECU-2020; UAC-558)

A NaI(Tl) crystal, 1½ in. in diameter and ⅜ in. high has been used in conjunction with a 5819 photomultiplier. Measurements of the resolution have been made for various γ rays and data are tabulated and plotted.

3727

INVESTIGATIONS OF ATOMIC AND MOLECULAR ABSORPTION SPECTRA. I-GENERAL FEATURES. II-SCHUMANN REGION ABSORPTION SPECTRUM OF GALLIUM VAPOUR. W. R. S. Garton. Proc. Phys. Soc. (London) A65, 268-76 (1952) Apr. 1.

Previous work on far ultraviolet atomic absorption spectra is summarized and discussed with particular regard to the phenomenon of auto-ionization. Details are given of a current program of work on line and band absorption spectra of vaporized elements and hydrides, in which special attention is paid to the vacuum ultraviolet. Results for the Schumann region absorption spectrum of Ga vapor are given. (auth)

THEORETICAL PHYSICS

3728

ON THE THERMODYNAMICS OF WAVE FIELDS. A. E. Scheidegger and C. D. McKay. Can. J. Phys. 30, 117-18 (1952) Mar.

It is shown that the thermodynamic functions cannot be defined for a nonquantized field theory in the usual way; i.e., if there exists a partition function in Gibbs' sense at all, $Z = \int \exp(-\vartheta H)\, d^{2N}\Omega$ is not the correct one. (auth)

3729

ON INTERPRETATION OF QUANTUM MECHANICS WITH THE AID OF HIDDEN VARIABLES IN THE SENSE OF DAVID BOHM. René Dugas. Compt. rend. 234, 1599-1601 (1952) Apr. 16. (In French; cf. NSA 6-2235 and 6-2236)

Bohm's interpretation of quantum theory in terms of "hidden" variables (Phys. Rev. 85, 166-93(1952)) is criticized. Hertz's similar attempt in the classical field is recalled.

3730

ELECTROMAGNETIC COULOMB SCATTERING OF PARTICLES OF SPIN 0, $\hbar/2$, OR $\hbar$. Gérard Petiau. Compt. rend. 234, 1601-3 (1952) Apr. 16. (In French)

Covariant expressions are derived for electromagnetic coulomb scattering cross sections for the interaction of two distinct particles having between them all possible combinations of spins 0, ½, or 1.

3731

QUANTIZATION OF WAVE FIELDS WITH A FINITE NUMBER OF COMPONENTS. V. I. Karpman. Zhur. Eksptl'. i Teoret. Fiz. 21, 1337-49(1951) Dec. (In Russian)

On the basis of Gel'fand and Yaglom's work (Zhur. Eksptl'. i Teoret. Fiz. 18, 703, 1096(1948); NSA 4-1287) wave fields describing particles with arbitrary spin, having a limited number of components, and satisfying a relativistic-invariant equation are quantized. It is shown that all limited-component wave fields may be quantized in conformity with Pauli's generalized theorem.

3732

VELOCITY-DEPENDENT POTENTIALS FOR PARTICLES MOVING IN GIVEN ORBITS. Moody L. Coffman. Am. J. Phys. 20, 195-9(1952) Apr.

Velocity-dependent potential functions can sometimes be used to determine the field of force that can be applied in order that particles may move in specified paths. In particular, the electromagnetic field vectors **E** and **B** can be determined from such a potential function if the paths on which charged particles move are specified. The velocity-dependent potential U is related to the kinetic energy T and the Lagrangian function L by the equation $U = T - L$, where L is an arbitrary solution of the Lagrange equation $(d/dt)(\partial L/\partial p') - (\partial L/\partial p) = 0$, where $p =$ constant represents the orthogonal trajectories of the curves which describe the paths the particles are to follow. From the velocity-dependent potential function U, the field of force can be calculated by the definition $Q_p = -(\partial U/\partial p) + (d/dt)(\partial U/\partial p')$. (auth)

3733

POINCARE'S THEOREM AND ITS USES. R. P. Singh. Indian J. Phys. 34, 585-93(1951) Dec.

The paper contains a general statement of the virial theorem which has been applied to find the periods of fundamental mode of oscillation of the electronic cloud of an atom and also of an atomic nucleus. The method adopted is the same as used by Ledoux (1945) and Pekeris (1941) for calculating the period of oscillation of a variable star. The method seems to give values of correct order for the above quantities. (auth)

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For each reference the digit preceding the dash is the volume number and digits after the dash are the abstract number.

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NUMERICAL INDEX OF REPORTS

Numerical Index of Official Atomic Energy Reports with Indications of Their Availability

This list in the individual issues of Volume 6 supplements the Numerical Index of Reports with Indications of Their Availability which appears in NSA, Volume 5, No. 24. As reports are in manuscript form when abstracted for NSA, there may be some delay before the reports will be available at the Depository Libraries. The notation NSA in the Availability column indicates the appearance of a report in its entirety in NSA.

Abbreviations used below are:
NSA - NUCLEAR SCIENCE ABSTRACTS
ADD - ABSTRACTS OF DECLASSIFIED DOCUMENTS the predecessor of NSA
NNES - National Nuclear Energy Series, published by the McGraw-Hill Book Company

Code designations are assigned as follows:
MDDC - To declassified reports released by the Manhattan Engineer District and by the Atomic Energy Commission before March 1, 1948
AECD - To declassified reports released by the Atomic Energy Commission after February 29, 1948 (appeared in April 15, Nuclear Science Abstracts)
AECU - To unclassified reports originating within the Atomic Energy Project. (Subsequent to AECU-871, this code is applied only to reports carrying no other recognized code designation.)

Other code designations below are assigned to unclassified reports by the originating installations

Report	Abstract	Availability
AECD-2984	NSA 5-814	Dissertation, Iowa State Coll., 1951
3294	6-1503	Revs. Modern Phys. 24, 1-14(1952)
3342	6-2593	$0.10
AECU-1311	5-4079	Phys. Rev. 86, 205-8(1952)
1607	5-5907	Rev. Sci. Instruments 23, 97(1952)
1658	5-6706	J. Am. Chem. Soc. 74, 1563(1952)
1760	6-987	Phys. Rev. 86, 302-7(1952)
1917	6-2471	Phys. Rev. 86, 155-62(1952)
AERE-C/R-758	6-358	Nature 169, 622(1952)
ANL-4626	5-5435	Revs. Modern Phys. 23, 315-27(1951)
BNL-1057	6-1530	Phys. Rev. 86, 165-7(1952)
1084	6-1341	Phys. Rev. 86, 271-4(1952)
HW-21552	6-2268	$0.10
ISC-183	6-2464	$0.25
201	6-2167	Phys. Rev. 86, 249-51(1952)
K-728	5-3654	J. Am. Chem. Soc. 74, 749-53(1952)
KAPL-674	6-2013	$0.10
NAA-SR-80	5-4589	Phys. Rev. 86, 228-34(1952)
NBS-1344	6-1748	Phys. Rev. 86, 235-42(1952)
NP-1887	5-920	Am. J. Roentgenol. and Radium Therapy 67, 620-7(1952)
NP-3642	NSA 6-2558	Proc. Soc. Exptl. Biol. Med. 79, 179-81(1952)
3727	6-2838	Science 115, 146-7(1952)
NYO-622	6-2989	Phys. Rev. 78, 479-80(1950)
905	6-1534	Phys. Rev. 86, 167-70(1952)
3159	6-2321	J. Am. Chem. Soc. 74, 1843(1952)
3166	6-1738	$0.15
ORNL-1186	6-1598	Blood 7, 404-16(1952)
ORO-46	5-5944	Phys. Rev. 86, 190-5(1952)
TID-4005	6-2552	$0.60
5078	6-2986	$0.30
UCLA-136	5-4055	J. Nutrition 46, 499-514(1952)
148	5-4946	J. Nutrition 46, 499-514(1952)
161	5-6958	Am. J. Physiol. 168, 628-36(1952)
169	6-69	J. Pharmacol. Exptl. Therap. 104, 348-53(1952)
176	6-1380	$0.25
180	6-1600	Proc. Soc. Exptl. Biol. Med. 79, 547-550(1952)
UCRL-1285	5-4830	Am. J. Phys. 20, 5-13(1952)
1397	5-5128	Anal. Chem. 24, 708-10(1952)
1495	6-317	Phys. Rev. 86, 180-9(1952)
1581	6-1326	Phys. Rev. 86, 325-32(1952)
1619	6-1835	$0.10
1668	6-2903	J. Am. Chem. Soc. 74, 2045-7(1952)

NEW NUCLEAR DATA

Summary of New Nuclear Data on Half Lives, Radiations, Relative Isotopic Abundances, Nuclear Moments, Neutron Cross Sections, Reaction Energies, and Masses

Prepared by National Bureau of Standards Nuclear Data Group with the Assistance of Readers

For a list of the abbreviations used in this section, see NSA, Vol. 6, No. 6B, page "SUPPLEMENT 1".

${}_{0}\mathrm{n}^{4}_{4}$	Not found from Rh or Bi (18 Mev n)	K.-H. Sun et al., Phys. Rev. 85, 942 (1952).
${}_{3}\mathrm{Li}^{7}_{4}$	μ 3.2569 I	T. Kanda et al., Phys. Rev. 85, 938(1952).
	Level $\mathrm{Be}^{9}(d,\alpha)$ 4.59	A. Ashmore and J. F. Raffle, Proc. Phys. Soc. (London) A65, 296(1952).
${}_{4}\mathrm{Be}^{8}_{4}$	Resonance $\mathrm{Li}^{7}(p,n)\mathrm{Be}^{7}$ Level E_0 Γ ~21.5 ~4.9 ~0.4	J. K. Bair et al., Phys. Rev. 85, 946 (1952).
${}_{4}\mathrm{Be}^{9}_{5}$	$\mathrm{Li}^{6}(t,p)\mathrm{Li}^{8}$ Li^{8} identified $E_t = 0.35$	C. D. Moak et al., Phys. Rev. 85, 928 (1952).
${}_{5}\mathrm{B}^{9}_{4}$	No levels Be(p,n) for $E_p = 2$ to 5.3	T. M. Hahn et al., Phys. Rev. 85, 934 (1952).
${}_{5}\mathrm{B}^{10}_{5}$	Resonances $\begin{cases}\mathrm{Be}^{9}(p,n)\mathrm{B}^{9}\\ \mathrm{Be}^{9}(p,\gamma)\mathrm{B}^{10}\end{cases}$ E_0 Γ 2.57 4.72 ~0.5	T. M. Hahn et al., Phys. Rev. 85, 934 (1952).
${}_{8}\mathrm{O}^{15}_{7}$	Capture γ's $N(p,\gamma)$ 0.75 5.29 1.39 6.21 2.38 6.84 scin	C. H. Johnson et al., Phys. Rev. 85, 931 (1952); 85, 727A (1952).
${}_{10}\mathrm{Ne}^{20}_{10}$	Resonances $\begin{cases}\mathrm{F}^{19}(p,\alpha\gamma)\mathrm{O}^{16}\\ \mathrm{F}^{19}(p,n)\mathrm{Ne}^{19}\end{cases}$ $E_p = 0.2 - 5.4$	H. B. Willard et al., Phys. Rev. 85, 849 (1952).
Na	σ_t(2 to 80 kev n) graph E_0 2.8, 55 kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
${}_{11}\mathrm{Na}^{23}_{12}$	μ 2.2167 I	T. Kanda et al., Phys. Rev. 85, 938(1952).
${}_{13}\mathrm{Al}^{27}_{14}$	μ 3.6395 I	T. Kanda et al., Phys. Rev. 85, 938(1952).
${}_{15}\mathrm{P}^{31}_{16}$	μ 1.1308 I	T. Kanda et al., Phys. Rev. 85, 938(1952).
${}_{17}\mathrm{Cl}^{35}_{18}$	μ 0.82110 I	H. E. Walchli et al., Phys. Rev. 85, 922 (1952).
${}_{17}\mathrm{Cl}^{35}_{18}$	q coupling ratio $\mathrm{TlCl}^{35}/\mathrm{TlCl}^{37}$ M 1.2691 ± 0.0004 1.270 ± 0.005 M	R. O. Carlson et al., Phys. Rev. 85, 784 (1952). H. J. Zeiger, D. I. Bolef, Phys. Rev. 85, 788(1952).
${}_{18}\mathrm{A}^{38}_{20}$	Resonances $\mathrm{Cl}^{37}(p,n)\mathrm{A}^{37}$ over 100 found for $E_p = 1.64$ to 2.51	W. A. Schoenfeld et al., Phys. Rev. 85, 873(1952).
${}_{18}\mathrm{A}^{41}_{23}$	$\beta\gamma$ delay scin 6.7×10^{-9s}	L. G. Elliott, Phys. Rev. 85, 942(1952).
${}_{20}\mathrm{Ca}^{41}_{21}$	τ $1.2 \times 10^{5y*}$ K x ray pc	F. Brown et al., Phys. Rev. 84, 1243(1951). *Based on $\sigma[\mathrm{Ca}^{40}(n,\gamma)\mathrm{Ca}^{41}] = 0.35$ and K fluorescence yield = 0.1.
${}_{20}\mathrm{Ca}^{48}_{28}$	τ $>2 \times 10^{16y}$	J. W. Jones, T. P. Kohman, Phys. Rev. 85, 941(1952).
Ti	σ_t(2 to 40 kev n) graph E_0 19, 23 kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
V	σ_t(2 to 25 kev n) graph E_0 7, 13, 17, 23? kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
${}_{23}\mathrm{V}^{50}_{27}$	μ/I I $+0.55704 \pm 0.00006$	H. E. Walchli et al., Phys. Rev. 85, 922 (1952).
Mn	σ (2 to 80 kev n) graph E_0 2.8, 8, 23, 38 kev (60, 67, 78) ?	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
Fe	σ_t(77 to 800°K) (E_n ~0.002 ev) graphs	R. Latham, J. M. Cassels, Proc. Phys. Soc. (London) A65, 241(1952).
	σ_t(2 to 24 kev n) graph E_0 8.5, 16? kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
Co	σ_t(2 to 100 kev n) graph E_0 5.5, 8?, 29.5 kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).

${}_{27}\mathrm{Co}_{33}^{60}$ 5.2^{y}	μ 3.0	$\gamma(\theta,T)$	B. Bleaney et al., Phys. Rev. 85, 688 (1952).
	3.2	$\gamma(\theta,T)$	C. J. Gorber et al., Physica 18, 135 (1952).
Ni	σ_t(2 to 41 kev n) graph E_0 4.5, 17, 30? kev		C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
${}_{30}\mathrm{Zn}_{37}^{67}$	I ⁵⁄₂ μ +0.87376 ±0.00013	I	S. S. Dharmatti, H. E. Weaver, Jr., Phys. Rev. 85, 927(1952).
${}_{33}\mathrm{As}_{43}^{76}$	γ 1.0* 0.555 0.095 0.648 0.25 1.21 0.016 1.41 0.055 2.06	sl; pe⁻, Cpt	P. Hubert, J. de Phys. et Radium 12, 823 (1951). *Relative intensity.
${}_{33}\mathrm{As}_{46}^{79}$	β^- ~2.1 No γ	a	P. J. Van der Haack et al., Physica 18, 20(1952). Se(n), Se(d); chem.
${}_{37}\mathrm{Rb}_{48}^{85}$	μ 1.3486	I	H. E. Walchli et al., Phys. Rev. 85, 922 (1952).
${}_{46}\mathrm{Pd}_{62}^{108}$	$\tau_{\beta\beta}$ $>1.1 \times 10^{18^y}$	cc	R. G. Winter, Phys. Rev. 85, 687(1952).
${}_{46}\mathrm{Pd}_{64}^{110}$	$\tau_{\beta\beta}$ $>6 \times 10^{17^y}$	cc	R. G. Winter, Phys. Rev. 85, 687(1952).
${}_{47}\mathrm{Ag}_{68}^{115}$	τ 21^m p $\left\{\begin{array}{l}(90.8\%)2.3^d\mathrm{Cd}\\(9.2\%)43^d\mathrm{Cd}\end{array}\right.$		A. C. Wahl and N. A. Bonner, Phys. Rev. 85, 570(1952).
${}_{48}\mathrm{Cd}_{67}^{115}$ 43^d	β^- 1.5 p (<0.02%)4.5^hIn	a	A. C. Wahl and N. A. Bonner, Phys. Rev. 85, 570(1952).
${}_{48}\mathrm{Cd}_{67}^{115}$ 2.33^d	τ 2.21 ± 0.04^d β_1 15% 0.5 β_2 85% 1.1 γ ~0.55 $\beta_1\gamma$	 a a a	A. C. Wahl and N. A. Bonner, Phys. Rev. 85, 570(1952). Cd(n,γ); Cd(γ,n); and fission.
Te	Isotope shift increase at $\mathrm{Te}^{126} - \mathrm{Te}^{124}$	S	J. S. Ross and K. Murakawa, Phys. Rev. 85, 559(1952).
${}_{52}\mathrm{Te}_{73}^{125}$ 58^d	γ 0.110 $\alpha_K = 160$ (0.035) $\alpha_K = 11.4$ M1 K/L = 7.1, L/M = 5.3	sl,scin,pc	J. C. Bowe and P. Axel, Phys. Rev. 85, 858(1952); 85, 734A(1952).
${}_{52}\mathrm{Te}_{73}^{125}$ stable	μ −0.7 $\mu(\mathrm{Te}^{125})/\mu(\mathrm{Te}^{123}) = 1.186$	S	J. S. Ross and K. Murakawa, Phys. Rev. 85, 559(1952).
${}_{60}\mathrm{Nd}_{87}^{147}$	γ 0.0918 $K/L_I = 6.4$	sπ	J. W. Mihelich and E. L. Church, Phys. Rev. 85, 690(1952).
${}_{64}\mathrm{Gd}_{95}^{159}$	18^h produced by Gd(γ)		F. D. S. Butement, Proc. Phys. Soc. (London) A64, 395 (1951).
${}_{66}\mathrm{Dy}_{99}^{165}$ 2.4^h	γ 0.0951 $K:L_I:L_{III}$ = 6.4:1.0:<0.2	sπ	J. W. Mihelich and E. L. Church, Phys. Rev. 85, 690(1952).
${}_{67}\mathrm{Ho}_{99}^{166}$ 27.3^h	γ 0.0807 $K:L_I:L_{II}:L_{III}$ = 0.13:<0.1:0.72:1	sπ	J. W. Mihelich and E. L. Church, Phys. Rev. 85, 690(1952).
${}_{67}\mathrm{Ho}_{99}^{166}$	τ $>30^y$ β_1 46% 0.18 β_2 46% 0.28 β_3 8% 1.1 γ_1 0.095 γ_2 0.212 γ_3 0.280 γ_4 0.725 γ_5 0.830	 a$\beta\gamma$ a$\beta\gamma$ a scin	F. D. S. Butement, Proc. Phys. Soc. (London) A65, 254 (1952). Ho(n,γ); chem. (β_1 or β_2)(γ_4 or γ_5), $\beta_3\gamma_2$, (γ_4,γ_5)(γ_3) Er K x ray.
Er	Isotope shifts (170-168):(168-166): (166-164) = 1:0.9:0.9	S	K. Murakawa and S. Suwa, Phys. Rev. 85, 683(1952).
${}_{69}\mathrm{Tm}_{101}^{170}$	β_1 0.876 β_2 0.970 β_1 F-K plot linear	sl;$\beta\gamma$ sl	R. Richmond and H. Rose, Phil. Mag. (7) 43, 367(1952).
	γ 0.0848 $K:L_I:L_{II}:L_{III}$ = 0.29:<0.1:0.83:1	sπ	J. W. Mihelich and E. L. Church, Phys. Rev. 85, 690(1952).
${}_{71}\mathrm{Lu}_{105}^{176}$ 3.7^h	γ 0.0889 $K:L_{II}:L_{III}$ = 0.24:0.71:1	sπ	J. W. Mihelich and E. L. Church, Phys. Rev. 85, 690(1952).
Hf	Relative abundances* 170, 171 <0.004% 172, 173 <0.005% 175 <0.006%		H. E. Duckworth et al., Phys. Rev. 85, 929(1952). *Assuming Hf^{174} = 0.18%.
${}_{73}\mathrm{Ta}_{110}^{183}$	τ 4.83^d		F. D. S. Butement, Proc. Phys. Soc. (London) A64, 395 (1951). W(γ); chem.
Pt	Relative abundances* 188, 189 <0.002% 191 <0.004% 193 <0.009% 197 <0.010% 199 <0.008% 200 <0.007%		H. E. Duckworth et al., Phys. Rev. 85, 929(1952). *Assuming Pt^{190} = 0.012%.
${}_{79}\mathrm{Au}_{118}^{197}$	μ +0.136	S	F. G. Kelly, Proc. Phys. Soc. (London) A65, 250(1952).
${}_{79}\mathrm{Au}_{121}^{200}$	48^m produced by Hg(γ); chem		F. D. S. Butement, Proc. Phys. Soc. (London) A64, 395 (1951).
${}_{82}\mathrm{Pb}_{128}^{210}$	β^- 0.018 E_{dis} 0.065	pc	G. M. Insch et al., Phys. Rev. 85, 805 (1952).
${}_{82}\mathrm{Pb}_{130}^{212}$	Hρ(F) 1388.5 ± 0.3 Hρ(I) 1753.9 ± 0.4	sl	H. Craig, Phys. Rev. 85, 688(1952).
${}_{83}\mathrm{Bi}_{129}^{212}$	Hρ(A) 533.66 ± 0.12	sl	H. Craig, Phys. Rev. 85, 688(1952).

${}_{84}Po^{210}_{126}$	$\alpha\gamma(\theta)$ indicates E2 γ $\alpha\gamma$ delay $<10^{-9s}$	scin	S. DeBenedetti and G. H. Minton, Phys. Rev. 85, 944(1952); 85, 726A(1952).

Q's Between Ground States

$Be^9(\gamma,n)Be^8$	-1.664 ± 0.002	J. C. Noyes et al., Phys. Rev. 85, 727A(1952).
$D(\gamma,n)H^1$	-2.231 ± 0.003	J. C. Noyes et al., Phys. Rev. 85, 727A(1952).
$Mg^{24}(p,n)Al^{24}$	-14.8 ± 0.3	A. C. Birge, Phys. Rev. 85, 753A(1952).
$F^{19}(p,n)Ne^{19}$	-4.040 ± 0.004	H. B. Willard et al., Phys. Rev. 85, 849(1952).
$Cl^{37}(p,n)A^{37}$	-1.598 ± 0.002	W. A. Schoenfeld et al., Phys. Rev. 85, 873(1952).
$Cr^{53}(p,n)Mn^{53}$	-1.380 ± 0.008	J. A. Lovington et al., Phys. Rev. 85, 585(1952).
$Cr^{54}(p,n)Mn^{54}$	-2.163 ± 0.005	J. A. Lovington et al., Phys. Rev. 85, 585(1952).
$Mg^{24}(d,p)Mg^{25}$	$+4.99 \pm 0.10$	J. Ambrosen, Nature 169, 408(1952).
$Mg^{25}(d,p)Mg^{26}$	$+8.86 \pm 0.10$	J. Ambrosen, Nature 169, 408(1952).
$Mg^{26}(d,p)Mg^{27}$	$+4.16 \pm 0.10$	J. Ambrosen, Nature 169, 408(1952).

Packing Fraction Differences, Δf, in Units 10^{-4} amu.

Doublet	Δf	Reference
$K^{39} - C_2HN$	-475.8 ± 0.8	A. Henglein, Z. Naturforsch. 6a, 745(1951).
$K^{41} - C_2H_3N$	-651.3 ± 0.5	A. Henglein, Z. Naturforsch. 6a, 745(1951).

Atom	Mass	Reference
Na^{23}	22.99665 ±0.00008	A. Henglein, Z. Naturforsch. 6a, 745(1951). Double doublet
Pb^{208}	208.0416 ±0.0015	P. I. Richards et al., Phys. Rev. 85, 630(1952). Time of flight.
Bi^{209}	209.0466 ±0.0015	P. I. Richards et al., Phys. Rev. 85, 630(1952). Time of flight.

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AVAILABILITY OF AEC RESEARCH AND DEVELOPMENT REPORTS

The Reports Reference List indicates the declassified and unclassified research reports which are abstracted in this issue of Nuclear Science Abstracts.

Many of these reports are or will be published in the scientific and technical journals or in volumes of the National Nuclear Energy Series. Upon publication, the report is listed in the supplements to the Numerical Index of Reports, found in the back of each issue of Nuclear Science Abstracts.

Reports not intended for publication are sent to the AEC depository libraries listed below as soon as possible after being abstracted. (Some of this group are also for sale by the Office of Technical Services, Department of Commerce, Washington 25, D. C., which will send price lists upon request.)

HOW TO LOCATE AEC REPORTS

If the AEC report number is known, the searcher should go directly to the cumulative Numerical Index of AEC Reports in Nuclear Science Abstracts, Volume 5, No. 24, Dec. 31, 1951, or, for recent reports, to the supplements to this index in each issue beginning with Volume 6, No. 1 (Jan. 15, 1952). The Numerical Index of Reports includes a complete list of AEC reports, by number, giving the related abstract number and (where applicable) the journal reference, the National Nuclear Energy Series citation, or the availability through the Office of Technical Services. (Where no indication of availability is given, the report is or will be found at the depository libraries.)

If the AEC report number is not known, searching is aided by the Subject and Author indexes of Nuclear Science Abstracts. The indexes refer to an abstract from which the report number may be noted. Declassified reports numbered through 2023 are indexed in the separate, Declassified Documents Cumulative Index, and their abstracts appear in the journal, Abstracts of Declassified Documents. (Both index and journal are available at depository libraries and are for sale by the Office of Technical Services.)

More complete information is given in a pamphlet, "Availability of USAEC Research and Development Reports," which may be obtained upon request from the Technical Information Service, U. S. Atomic Energy Commission, P. O. Box 62, Oak Ridge, Tennessee.

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